UNC/GJ-HMWP-2

ENVIRONMENTAL MONITORING REPORT ON DEPARTMENT OF ENERGY FACILITIES AT GRAND JUNCTION, COLORADO, AND MONTICELLO, UTAH, FOR CALENDAR YEAR 1986

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FOREWARD

The annual environmental monitoring report on U.S. Department of Energy (DOE) facilities at Grand Junction, Colorado, and Monticello, Utah, is conducted by contractor personnel at the DOE Grand Junction Projects Office facility. Environmental monitoring activities during 1986 were under the supervision of Nic Korte and Sandra Wagner. This report was prepared by Michael Sewell using data collected by Korte and Wagner. UNC succeeded Bendix Field Engineering Corporation as contractor for the DOE Grand Junction Projects Office facility on October 1, 1986.

Section I

SUMMARY

GRAND JUNCTION PROJECTS OFFICE FACILITY

The shallow gravel aquifer that underlies the Grand Junction, Colorado, Department of Energy (DOE) facility is contaminated by uranium mill tailings. Uranium, molybdenum, arsenic, and selenium are all found in significantly elevated concentrations. For example, the Safe Drinking Water Act has set limits of 0.05 mg/l arsenic and 0.01 mg/l selenium. Both of these limits are regularly exceeded in groundwater samples collected within 6 meters of the Gunnison River. Selenium levels have been as high as 0.066 mg/l, and arsenic levels as high as 0.51 mg/l. There are no standards promulgated for molybdenum, but the National Academy of Sciences (1972) has suggested a limit of 0.01 mg/l for agricultural use. One well near the perimeter of the facility, and within a few meters of the river, contains approximately 2.0 mg/l molybdenum. Uranium levels correlate well with those of molybdenum except that they are generally greater, with several wells on the river dike containing more than 1 mg/l.

Surface water on the facility consists of two lagoons and a drainage ditch. The most serious contamination detected in 1986 was radium-226 in the ditch adjacent to the river dike. Results of the January 1986 sampling indicate a radium-226 concentration in the ditch of 21.8 pCi/l compared with the standard for drinking water of 5 pCi/l.

Samples were collected from the Gunnison River four times during the year at points upstream, alongside, and downstream of the facility. During one sampling period, five additional samples were collected alongside a large riverside tailings deposit. In no instance were uranium-related contaminants detected in the samples. Thus, the effect of the contaminated aquifer on the river is assumed to be negligible; however, this cannot be verified without additional testing.

In addition to the contamination discussed above, the presence of polychlorinated biphenyls (PCBs) is addressed in this report. Transformers on the facility have been properly labeled, and PCB-contaminated waste was disposed of in 1983.

There have been no significant process changes and no air-quality impacts reported during 1986. In response to the need to describe background conditions for the pending remedial action, however, three high-volume air samplers were installed in December 1985. Data from these samplers are briefly described in this report.

MONTICELLO MILLSITE

The shallow aquifer underlying the Monticello, Utah, DOE property is also contaminated by uranium mill tailings. Montezuma Creek, which flows through the property, has frequently contained contamination at levels exceeding State of Utah water-quality standards for several kilometers downstream from the property. Contamination in the creek results from seeps issuing from the contaminated alluvial aquifer. This seepage causes the uranium concentration in the creek to increase by as much as an order of magnitude; concentrations as high as 0.9 mg/l were detected 30 meters from the Government property in

1984. Similarly, selenium concentrations regularly exceeded 0.01 mg/l, the Utah standard for this section of Montezuma Creek. The creek is used both for irrigation and for livestock watering in the vicinity of the site. During 1985 and 1986, observed concentrations of uranium, selenium, and molybdenum were lower; however, fewer samples were collected than in previous years and samples were collected when water in the creek was at relatively high levels, thereby diluting the contaminants.

Concentrations in the shallow aquifer generally exceed those found in the surface water. Uranium, molybdenum, vanadium, selenium, and arsenic are all found in concentrations exceeding 1 mg/l in some wells. However, because of the low volume of water in this aquifer, State of Utah standards are apparently not applicable.

Extensive measurements of radon contamination from the tailings piles were conducted during 1984, 1985, and to a lesser extent in 1986. These include on-pile, site-boundary, and off-site Track Etch® measurements, as well as additional on- and off-pile radon-flux measurements. Results of these measurements, reported in the *Draft Environmental Assessment of Remedial Action at the Monticello Uranium Mill Tailings Site, Monticello, Utah* (Bendix Field Engineering Corporation, 1985), demonstrate that the EPA standard for radon emissions from inactive uranium processing sites is exceeded at all four tailings piles at the Monticello site.

Section II

INTRODUCTION

This report describes environmental monitoring activities conducted at the U.S. Department of Energy (DOE) Grand Junction, Colorado, Projects Office facility (Section III) and at the inactive uranium millsite in Monticello, Utah (Section IV).

GRAND JUNCTION PROJECTS OFFICE FACILITY

The Grand Junction Projects Office (GJPO) facility encompasses 48.6 acres and lies on the floodplain of the Gunnison River. An earthen dike is located between the facility and the river to the west. Although adjacent land is used primarily for agriculture, the facility is within approximately 1 kilometer of heavily populated areas.

Personnel at the GJPO facility develop, support, and/or administer a variety of programs. Historically, the Office was most heavily involved in uranium procurement, evaluation of domestic uranium resources, and advancement of geologic and geophysical exploration techniques. The scope of activities now includes provision of considerable support to the Government's various remedial action programs and to the Civilian Radioactive Waste Management (CRWM) program. Housed on the GJPO facility are fully equipped laboratories for analytical chemistry, mineralogy-petrology, and electronics. Research groups at the facility have also received funding for specific projects from a variety of entities, including the U.S. Environmental Protection Agency and the U.S. Department of Defense. UNC is the operating contractor for the Government-owned/contractor-operated (GOCO) facility.

No point-source discharges or waste-treatment activities occur on the facility. Uranium milling, analysis, and storage were conducted for a period of 25 to 30 years; these activities ceased in the mid-1970s. All present contamination is believed to be the result of these past activities. According to historical records (those maintained by the Department of Energy and its predecessor agencies, the Atomic Energy Commission and the Energy Research and Development Administration), approximately 32,000 tons of ore were processed. Most of the resulting tailings are buried in the "Tailings Area" (see Section III). In addition, approximately 25,000 cubic yards of contaminated material were used as backfill around the dike that separates the GJPO facility from the Gunnison River. Each of five other locations contains contaminated material in amounts ranging from 1000 to 6000 cubic yards, while several miscellaneous locations account for an additional 1000 cubic yards (Henwood and Ridolfi, 1986).

Cleanup of the buried mill tailings at the GJPO facility has been accepted under the Surplus Facilities Management Program (SFMP). Funding for this effort began in FY-1985.

MONTICELLO, UTAH, MILLSITE

Responsibility for administration, maintenance, and environmental monitoring of the inactive uranium millsite and tailings area at Monticello, Utah, formerly operated by the Atomic Energy Commission, resides with the DOE Grand Junction Projects Office. The site was accepted into the Surplus Facilities

Management Program in 1980. Under this program, the chief objective of the Monticello Remedial Action Project is to minimize potential health hazards to the public associated with the tailings at the millsite. In order to provide a basis for making remedial action decisions regarding the site, an environmental and engineering characterization was completed and documented in the *Monticello Remedial Action Project Site Analysis Report* (Abramiuk and others, 1984).

The Monticello millsite is a 78-acre tract located in San Juan County, Utah, adjacent to the city limits of Monticello. The mill area covers approximately 10 acres and the tailings impoundment area covers the remaining 68 acres. None of the original mill buildings remain, but contaminated foundations and scrap materials are buried on site. The tailings impoundment area contains almost 2 million tons of tailings and contaminated soil in four separate tailings piles. Results of additional surveys indicate the presence of more than 300,000 additional tons of contaminated material on adjacent open lands (Marutzky and others, 1985).

Prior to 1955, the environmental problems receiving attention at the Monticello mill arose from the salt-roast procedure used to enhance vanadium recovery. Studies indicated that an average of nearly 2600 pounds of dust containing 0.363 percent U_3O_8 and 1.52 percent V_2O_5 escaped daily through the roaster stack (Allen and Klemenic, 1954). Corrosion of wire fences, clotheslines, and galvanized roofs was verified by the mill operator in response to complaints from local residents.

Liquid effluent from the salt roast/carbonate leach plant, containing substantial concentrations of chloride, sulfate, carbonate, bicarbonate, sodium, and other dissolved species, was released into Montezuma Creek. Release of radium-226 was of special concern; soluble radium activity in Montezuma Creek was found to be 160 pCi/l. It was also recognized that the suspended solids contained considerable radium activity and that dry tailings were being washed into the creek (Whitman and Beverly, 1958).

During milling operations, the tailings were normally moist so that erosion by wind was minimal. Within a year after shutdown, however, the tailings dams and surfaces of the piles dried out, and tailings sand began to migrate as dunes. Erosion by water also became a problem. Several cleanup activities, conducted since the time of mill closure, have substantially stabilized the area, but have not eliminated water contamination.

Water contamination results from the leaching of the uranium mill tailings. Extensive studies conducted at Monticello (Abramiuk and others, 1984) demonstrate that all four tailings piles contribute to the contamination of groundwater and surface water, both on and off site.

QUALITY ASSURANCE

Quality Assurance (QA) measures were incorporated into all of the monitoring activities detailed in this report, and were appropriately documented. The general quality assurance policy and procedures, as presented in the *Quality Assurance Manual* (Bendix Field Engineering Corporation/Grand Junction Operations), were followed. In addition, certain documents were consulted to address QA considerations regarding specific measurement and sample-collection procedures. These include the following:

- DOE/GJPO *Handbook of Analytical and Sample-Preparation Methods* (Bendix Field Engineering Corporation)
- DOE/GJPO *Administrative Plan and Quality Control Methods for the Bendix/GJO Analytical Laboratories* (Bendix Field Engineering Corporation)
- Bendix/GJO *Environmental Sciences Procedure Manual: Second Edition* (Bendix Field Engineering Corporation)

Specific QA requirements for each project have been defined and were compiled as the following documents:

- SFMP/Grand Junction Projects Office (GJPO) Quality Assurance Program Plan (QAPP)
- SFMP/Monticello Remedial Action Project (MRAP) Quality Assurance Program Plan (QAPP)

Section III

GRAND JUNCTION, COLORADO, PROJECTS OFFICE FACILITY

AIR QUALITY

The Grand Junction air sampling program was initiated in July 1985. Three Sierra-Anderson Basic High Volume Air Samplers (Model 305) were installed, with flow controller and mechanical timers (Model 353). The flow controller pulls 40 standard cubic feet per minute (cfm) of air and particulates through the filter for a 24-hour period every 6 days. The flow controller is calibrated with a Kurz Model 341 electronic mass flow meter. Manometers attached to the flow controller units verify the accuracy of flow controller calibration. Total suspended particulates (TSP) are retrieved on 8-inch by 10-inch Whatman Number 41 cellulose filters.

The sampling sites (see Figure III-1) were determined from wind-rose data for the Grand Junction facility. Two principal wind vectors occur: North 36° West and South 33° East. The south station was originally intended to be the background station. However, the prevailing winds in the Gunnison River canyon where the facility is located are bidirectional so that the south station may periodically sample contaminant. Metal towers were erected on concrete pads at the sampling sites and the samplers were mounted so that the filter is 11 feet above ground level.

The south sampler site (No. 1) is located at the south end of the facility near Building 35. The west sampler site (No. 2) is located on the north edge of the Tailings Area, near the incinerator. The north sampler site (No. 3) is located at the north end of the facility, northeast of the North Pond.

Total suspended particulate sampling was initiated on December 16, 1985; Table III-1 lists maximum concentrations and the mean concentrations above detection limits (ADL) of selected elements from January 2, 1986, through September 9, 1986.

Table III-1. Concentration of Selected Elements in Airborne Particulates

Element	Number of Samples	Number of Samples ADL[a]	Concentration[b] Maximum	Concentration[b] Mean ADL
Cu	121	121	0.108	0.032
Fe	121	121	2.930	0.563
K	121	121	1.662	0.330
Mn	121	101	0.080	0.014
Pb	121	99	0.104	0.023
Ra-226	121	19	8.58×10^{-4}	3.1×10^{-4}
Th-230	121	48	1.0×10^{-3}	2.2×10^{-4}
U	121	41	7.3×10^{-3}	$1/0 \times 10^{-3}$
V	121	43	1.16×10^{-2}	2.7×10^{-3}

[a]ADL = Above Detection Limits.
[b]Results are in $\mu g/m^3$ except Ra-226 and Th-230 which are in pCi/m^3.

Plans for the 1987 monitoring program include the installation of 10-micron size screen in the selection inlet of the sampler to separate particles 10 microns or smaller in size from larger particles. The 10-micron or smaller size particles are considered to be "inhalable" particulates and will be collected on the cellulose filter in the sampler. The heavier wind-blown particulates and fugitive dust will be eliminated by the 10-micron size screen.

POLYCHLORINATED BIPHENYL (PCB) MONITORING

During 1982, a program was completed to identify and determine the total quantity of polychlorinated biphenyls (PCBs) and PCB-contaminated fluids on the facility. All facility transformers were opened and oil samples taken. These samples were analyzed in the Bendix Analytical Chemistry Laboratory, based on methods and standards provided by the Environmental Protection Agency. More than 1000 gallons of PCB-contaminated fluids were identified (Miller and Donivan, 1982). All PCB-contaminated labware and waste material (approximately 20.5 pounds) were disposed of during 1983.

WATER QUALITY

SAMPLING PROCEDURES

Water samples were collected at the GJPO facility in January, April, July, and October 1986. (For the purposes of this report, these are referred to as the four 1986 samplings.) Both groundwater and surface-water samples were obtained using a peristaltic pump. Samples were filtered through a 0.45-μm filter in line with the collection vessel. The samples were then preserved and analyzed according to procedures prescribed in Korte and Ealey (1983), Korte and Kearl (1985), and Bendix Field Engineering Corporation (undated). These procedures incorporate the major aspects of procedures published by the U.S. Environmental Protection Agency (1979a, 1979b, 1980, 1982a, 1982b) and the U.S. Geological Survey (1977). However, they provide much greater detail and include extensive quality-assurance measures.

SURFACE WATER

Figure III-1 shows the surface water sites that were routinely sampled during 1986. The North Pond is contaminated principally by uranium; recharge is primarily from the shallow gravel aquifer underlying the facility. Contamination levels are similar to those observed in previous years. Uranium concentrations in the four 1986 samplings averaged nearly 0.75 mg/l (Appendix A).

The South Pond ("Lagoon" on Figure III-1), also recharged primarily by the shallow gravel aquifer, was formerly used as a sewage lagoon. Currently, its principal source of effluent is storm runoff from the parking lots. Variable contamination by uranium has been observed: The sample collected in January contained 0.10 mg/l; the April 1986 sample also contained 0.10 mg/l; while the July 1986 sample contained 0.053 mg/l. This last value decreased to 0.038 mg/l by the time of the October sampling. These fluctuations are most likely related to water levels in the alluvium; that is, high water levels coincide with higher uranium concentrations in the lagoon.

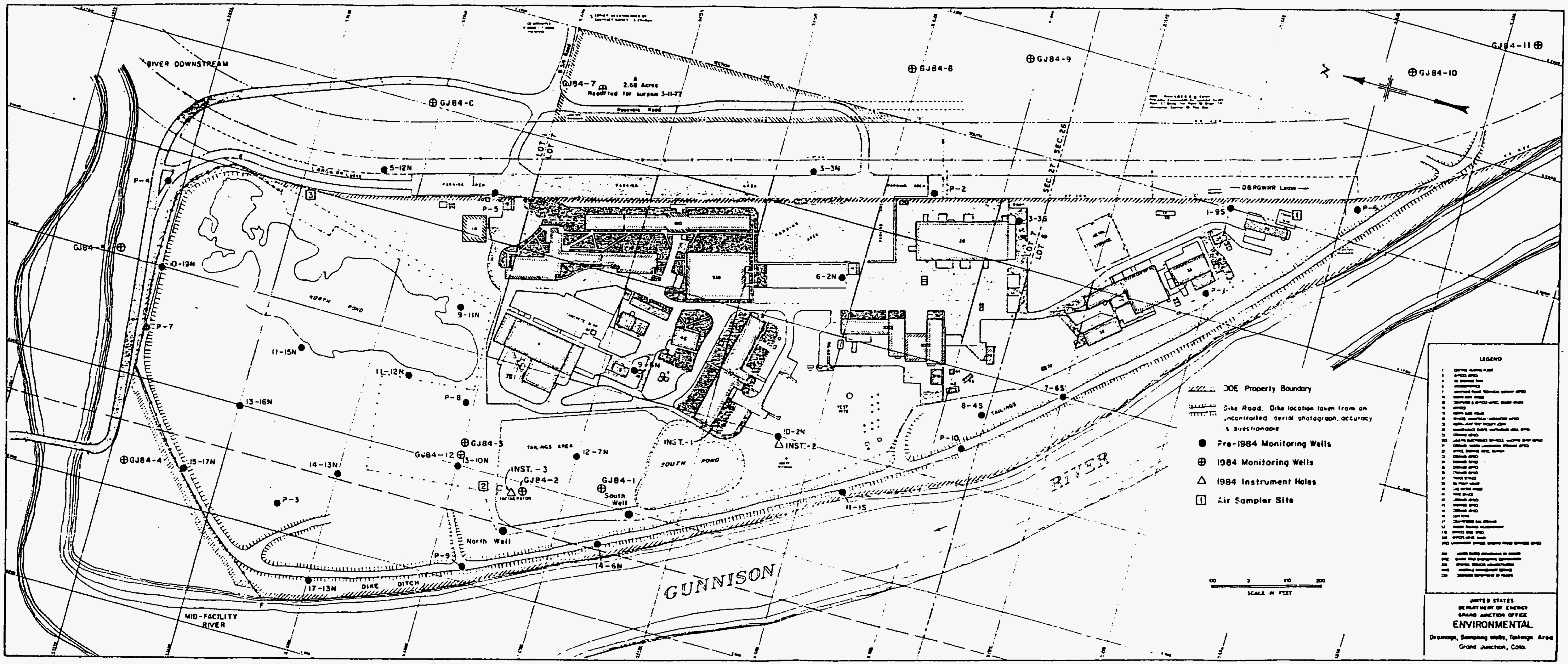

Figure III-1. Map of the GJPO Facility Showing Locations of Buildings, Pertinent Areas, and Monitoring Wells and Air Sampler Sites.

Previous environmental monitoring reports refer to a sampling location known as the drainage ditch. This area is located outside the facility fence directly west of the buried tailings area ("Tailings Area" on Figure III-1) and below the river dike. Formerly, the South Pond overflowed into the ditch more or less continuously; however, it has been observed on numerous inspections that the pond has not contained sufficient water to overflow since the facility was connected to the city sewer system in 1981. Nevertheless, water remains in the ditch area except during very dry seasons. Results of chemical analysis of the ditchwater indicate that radium-226 concentrations averaged 9.8 pCi/l in 1986 and were as high as 21.8 pCi/l in 1985. Concentrations of uranium and molybdenum were also high, the former exceeding 1.7 mg/l and the latter exceeding 0.6 mg/l in the January and October samplings, respectively.

The Gunnison River was sampled upstream, downstream, and alongside the facility during each of the four sampling periods in 1986. Five additional river samples were collected alongside a portion of the dike now known to be contaminated (Henwood and Ridolfi, 1986). Uranium-related contaminants were not detected in any of these samples, nor were significant differences in the three locations noted for any of the sampling periods. Slight increases for a few species are evident, but the differences are not sufficient to suggest contamination from the site.

The level of water in the ditch rises and falls with the level of water in the river; thus, there is a strong likelihood that contaminated water enters the river. Apparently, the volume of water in the river is sufficient to quickly dilute contaminants to background levels. The impact of the aquifer discharge into the river is discussed in detail in the draft Environmental Assessment for the GJPO facility (1987). The 1981 Environmental Monitoring Report (Korte and Thul, 1982) describes some weak evidence for river contamination; this is explained in part by the lower average flows in the river in 1981 relative to 1986.

An additional problem in assessing possible contamination of the Gunnison River results from the method used for sample collection. All the river samples have been "grab" samples collected from the riverbank; yet studies demonstrate that this type of sample does not yield an accurate picture of the concentration of material in a river (see, for example, Jaffe and others, 1982). A more extensive sampling study may be conducted in order to determine whether the river is affected by contaminants leaching from the GJPO facility.

GROUNDWATER

Analytical results on samples collected from the groundwater monitoring wells are also described empirically. The results of routine groundwater and surface-water sampling are presented in Appendix A. Quantitative interpretation of the data using computer modeling is presented in *Environmental Assessment of Remedial Action at the Grand Junction Projects Office Facility, Grand Junction, Colorado* (Draft) (UNC, 1987).

Based on results of the 1981 data, Wells P-2, P-6, 1-9S(D), 3-3N(D), and 5-12N(D) (Figure III-1) were expected to represent background. (The designation "D" denotes a two-well multilevel system at the particular location.) Results of subsequent samplings, however, indicate that this assumption is erroneous.

Uranium levels in Wells P-2 and P-6 reported in the 1981 report were less than 0.01 mg/l. During each of the succeeding years (1982 through 1985), samples from all five wells contained levels of uranium above the expected background concentration. Uranium concentrations ranged from approximately 0.02 mg/l in Well 3-3N(D) to 0.7 mg/l in the shallow well at location 1-9S. Except for Well 1-9S(D), the concentration of uranium ranged from 0.02 to 0.09 mg/l. Other anomalies also exist. For example, selenium was detected in Wells 5-12N(D), 1-9S(D), P-2, and 3-3N(D); contamination by zinc, vanadium, and manganese is evident in one or more wells. As a consequence, it became clear that none of these five wells represents background. For that reason, additional wells were drilled in 1984 (Sewell and Price, 1984); they are denoted by the prefix GJ84-. Data from five samplings of Wells GJ84-9, -10, and -11 indicate that average concentrations of uranium, arsenic, selenium, and molybdenum in these wells are all less than 0.01 mg/l.

The discussion that follows focuses on individual contaminants (cf. Figure III-1 for location information).

Uranium contamination is evident in all wells except those wells that represent background (GJ84-9, -10, and -11) and GJ84-1. The highest concentrations were found in Wells 8-4S, P-10, and 7-6S, which are located west of Building 3022. Similar concentrations, 2.0 mg/l or greater, were found in Well 10-2N, located south of Building 20, and in Well 11-15N which lies along the west bank of the North Pond. The uranium levels in most of the other wells were greater than 0.1 mg/l. The average concentration in the wells along the north dike has remained fairly constant over the past 5 years. Average uranium concentrations of 0.81 mg/l in 1982, 0.88 mg/l in 1983, 0.86 mg/l in 1984, 0.92 mg/l in 1985, and 0.77 in 1986 were determined from data for Wells P-4, 10-19N, P-7, and 15-17N; data from Wells GJ84-4 and -5 were included in the 1984, 1985, and 1986 averaging. The uranium concentrations along the west boundary (Wells 11-1S, P-10, 7-6S, and 8-4S) averaged 1.28 mg/l in 1986 with a high value of 3.6 mg/l in well P-10. Several of these wells are located on the river dike.

Molybdenum contamination is also widespread throughout the monitoring system. The highest concentration in 1986 occurred in Well 8-4S, exceeding 1.5 mg/l on two occasions. Several other wells (10-2N, P-1, 13-16N, 13-10N, P-10, and GJ84-12) consistently averaged 0.4 mg/l or above, throughout the year.

Arsenic contamination is localized in the vicinity of the buried tailings area. The concentrations, range from 0.16 to 0.45 mg/l, in Wells 14-6N, GJ84-2, GJ84-1, and the North Well during calendar year 1986. The average annual arsenic levels for other wells in this vicinity (GJ84-12, 13-10N, 12-7N, and the South Well) ranged from 0.06 to 0.30 mg/l. Well GJ84-12 was the only well near the buried tailings area that consistently contained less than 0.1 mg/l arsenic.

Selenium contamination appears to be greatest in the south end of the facility. Data from Wells 3-3S, 10-2N, 6-2N, 1-9S, 8-4S, 7-6S, and P-1 indicate average concentrations of 0.087 mg/l in January, 0.06 mg/l in April, 0.092 mg/l in July, and 0.129 mg/l in October.

Although the potential for radium contamination is a concern due to the nature of the buried waste, the conditions of high pH, high sulfate, and low barium in the alluvial aquifer lead to little or no radium migration. Only the dike ditch contained concentrations above the 5 pCi/l drinking water standard.

The drinking-water standard for nitrate-nitrogen is 10 mg/l, and several wells contained concentrations exceeding this limit. All of these wells are located roughly between Wells 1-9S (east of Building 34) and 11-12N(D) (near the North Pond). None of the perimeter wells contains high levels of nitrate.

COLORADO WATER-QUALITY STANDARDS

State of Colorado water-quality standards, as specified in the Colorado Water Quality Control Act, were reviewed with respect to contamination detected on the GJPO facility. Table III-2 presents the range of numerical standards for some of the contaminants found in the underlying gravel aquifer. There is no Colorado standard for molybdenum; however, the National Academy of Sciences (1972) has recommended an agricultural-use standard of 0.01 mg/l.

Table III-2. Colorado Water-Quality Standards for Selected Elements

Element	Maximum Contaminant Level (depending on use class and alkalinity)
Arsenic	0.05 - 0.1 mg/l
Selenium	0.01 - 0.05 mg/l
Uranium	0.03 - 1.4 mg/l
Radium-226 and -228	5.0 pCi/l

As the table demonstrates, application of these standards is complicated by the promulgation of varying contaminant levels for many trace elements, the applicable standard being dependent on the use classification and alkalinity of the water. The thrust of the Colorado statute is to clean up existing polluted waters and to prevent further degradation of any State waters. The shallow gravel aquifer underlying the GJPO facility is contaminated at levels that make it unfit for agricultural purposes, the lowest use class defined. However, the language in the Act seems to exempt past practices. In other words, since the shallow aquifer is not being used for any purpose, it may be interpreted that the Department of Energy is not mandated to clean it up. On the other hand, existing operations are not permitted to cause further degradation.

Contamination of the Gunnison River is another matter. The regulations clearly prohibit any facility from degrading the quality of a State river. Hence, it is important to know how much contaminated water enters the river and whether the levels are increasing or decreasing. These questions are addressed in Appendices D and F, *Environmental Assessment of Remedial Action at the Grand Junction Projects Office Facility, Grand Junction, Colorado* (Draft) (UNC, 1987).

Section IV

MONTICELLO, UTAH, MILLSITE

WATER QUALITY

SAMPLING PROCEDURES

Groundwater and surface-water samples were collected at the Monticello site in June and October of 1986 using a peristaltic pump, a bladder pump, or a Teflon bailer (Appendix A). Samples requiring filtration were filtered through a 0.45-μm filter in line with the collection vessel. The samples were then preserved as required and analyzed according to procedures prescribed in Korte and Ealey (1983), Korte and Kearl (1985), and Environmental Protection Agency (EPA) standards (U.S. Environmental Protection Agency, 1979a, 1979b, 1980, 1982a, 1982b).

SURFACE WATER

Characterization of Background

Background surface-water quality has been monitored for some years at the site labeled W-3 in Figure IV-1. This sampling point is located east of the culvert under U.S. Highway 163. Upstream samples (site T-1) have also been collected to verify that the W-3 site accurately represents the background water quality of Montezuma Creek (Korte and Thul, 1982, 1983).

In both 1986 samplings, surface water at site W-3 was characterized by low levels of toxic elements or mill-tailings-related contaminants. Elements not detected or found in very low concentrations include As, Ba, Cr, Fe, Mn, Mo, Pb, Se, U, V, and Zn. No Ra-226 was detected. The pH was 7.7 in both samplings, specific conductance ranged from 460 to 3250 μmhos/cm, and alkalinity from 135 to 153 mg/l (as $CaCO_3$).

Surface Water Contamination

Permanent surface water on the Government property consists of perennial flow in Montezuma Creek and in the drainage between the carbonate and vanadium piles (drainage designated W-2 on the map in Figure IV-1). There is intermittent water in seeps south of the carbonate and vanadium piles and east of the acid pile. The vanadium and acid pile seeps contain water in the Spring due to the melting of snow. The seep adjacent to the vanadium pile generally covers an area up to 5 square meters to a depth of 15 to 30 centimeters. The acid pile seep is contained by a small dam and, when full, is approximately four times larger in area than the vanadium pile seep.

The seep adjacent to the carbonate pile forms a small pond covering approximately 15 square meters. This pond contains water throughout the Summer and supports a few cattails; typically, it is the only one of the three seeps that contains water during the dry seasons.

A diversion ditch was constructed north of the east tailings pile in 1984 with a view to diverting some water away from the piles and thereby decreasing the volume of contaminated water that seeps out of the piles. Visual observations during 1985, however, did not indicate any decrease in water in the various seeps and small drainages that surround the piles.

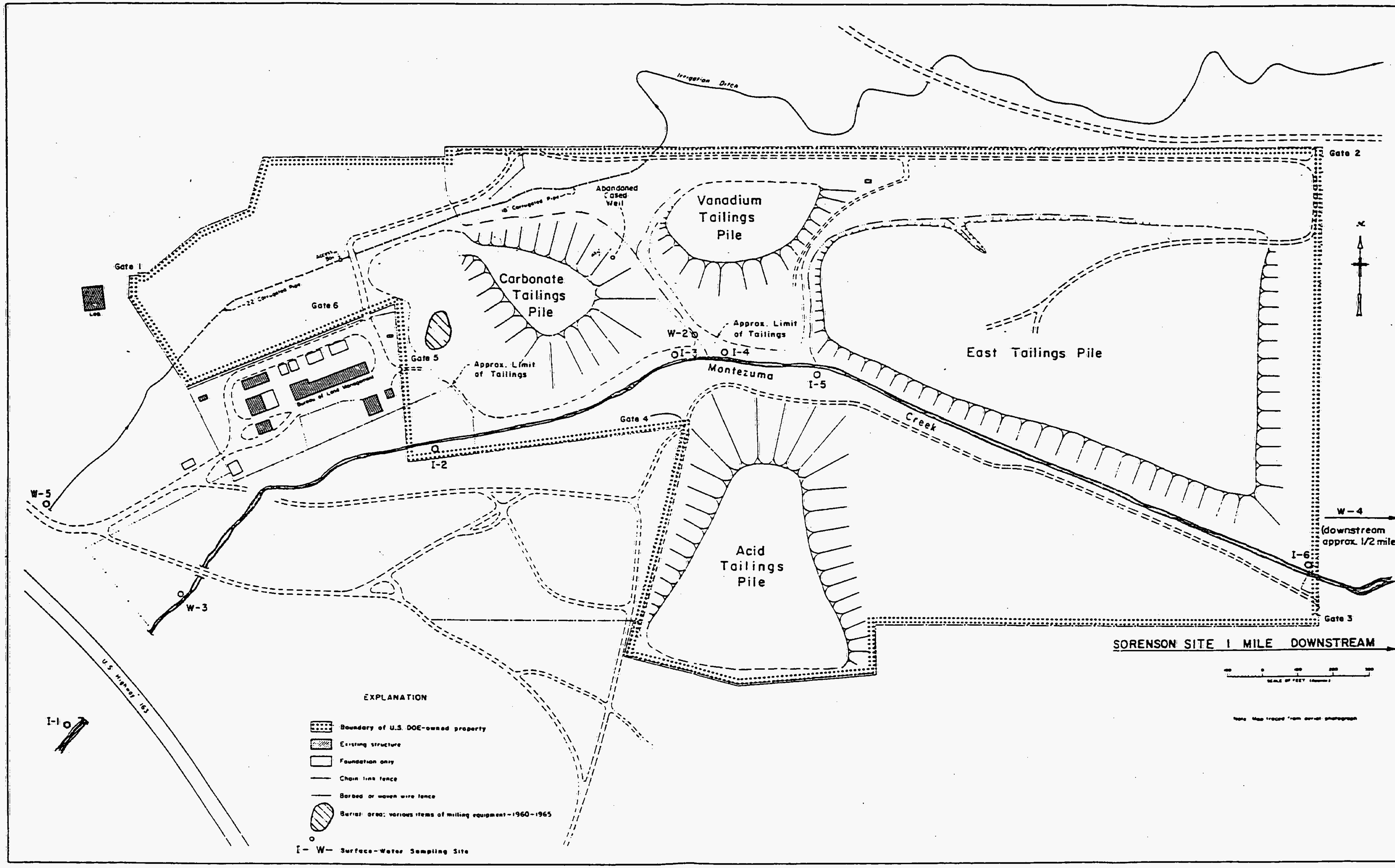

Figure IV-1. Sampling Locations for Surface Water at the Monticello Millsite

Sampling of the vanadium and carbonate seeps was conducted during August 1986. The vanadium pile seep contained 52.6 mg/l U and 360.0 mg/l V. The carbonate pile seep contained 2.3 mg/l U, 0.79 mg/l Mo, and 14.0 mg/l V. Subsequent sampling of the carbonate pile seep (October) yielded similar results.

Montezuma Creek flows through the middle of the property. As mentioned earlier, flow is perennial, although it can be quite low during the late Summer. There can also be substantial flooding with high flows, as was observed in the Spring of 1983. Results of previous studies (Korte and Thul, 1982, 1983) indicate that uranium contamination of the creek is observed prior to the point at which the creek traverses the tailings piles. However, concentrations of both molybdenum and uranium are typically higher off site, demonstrating that contributions from the alluvial aquifer to Montezuma Creek occur to the greatest extent downstream from the Government property.

Montezuma Creek

Seeps from the shallow aquifer are visible along the creek below the drop structure. Creek flow increases for approximately 2 kilometers and is perennial along this stretch. The W-4 sampling site is located approximately 100 meters downstream from the east boundary of the property. Except under conditions of very high flow, as during a storm event or Spring runoff, contamination levels frequently exceed State of Utah standards (for further discussion, see the section entitled Water-Quality Standards).

Samples have routinely been collected at what is known as the Sorenson site, located approximately 2 kilometers downstream from the Government property. It has been apparent from data comparison that little decrease in contamination is observed between the W-4 site and the Sorenson site. The shallow aquifer is contaminated as far downgradient as it has been sampled, and thus maintains high concentrations of the toxic elements in Montezuma Creek for a considerable distance off site. The downstream water quality of Montezuma Creek is described in detail in the 1983 Environmental Monitoring Report (Korte and Thul, 1984).

GROUNDWATER

Alluvial Aquifer Upgradient

Shallow-aquifer background groundwater-quality data have been acquired from Wells 19, 44, 43, and 20 (see Figure IV-2). Elements not detected or found in very low concentrations include As, Ba, Cl, Fe, Mo, Pb, Se, V, Zn, and Ra-226. Trace elements found in significant concentrations include Mn (0.6 to 1.0 mg/l) and U (as much as 0.23 mg/l). The pH ranged from 6.8 to 7.2, specific conductance from 800 to 1000 μmhos/cm, and alkalinity from 192 to 343 mg/l.

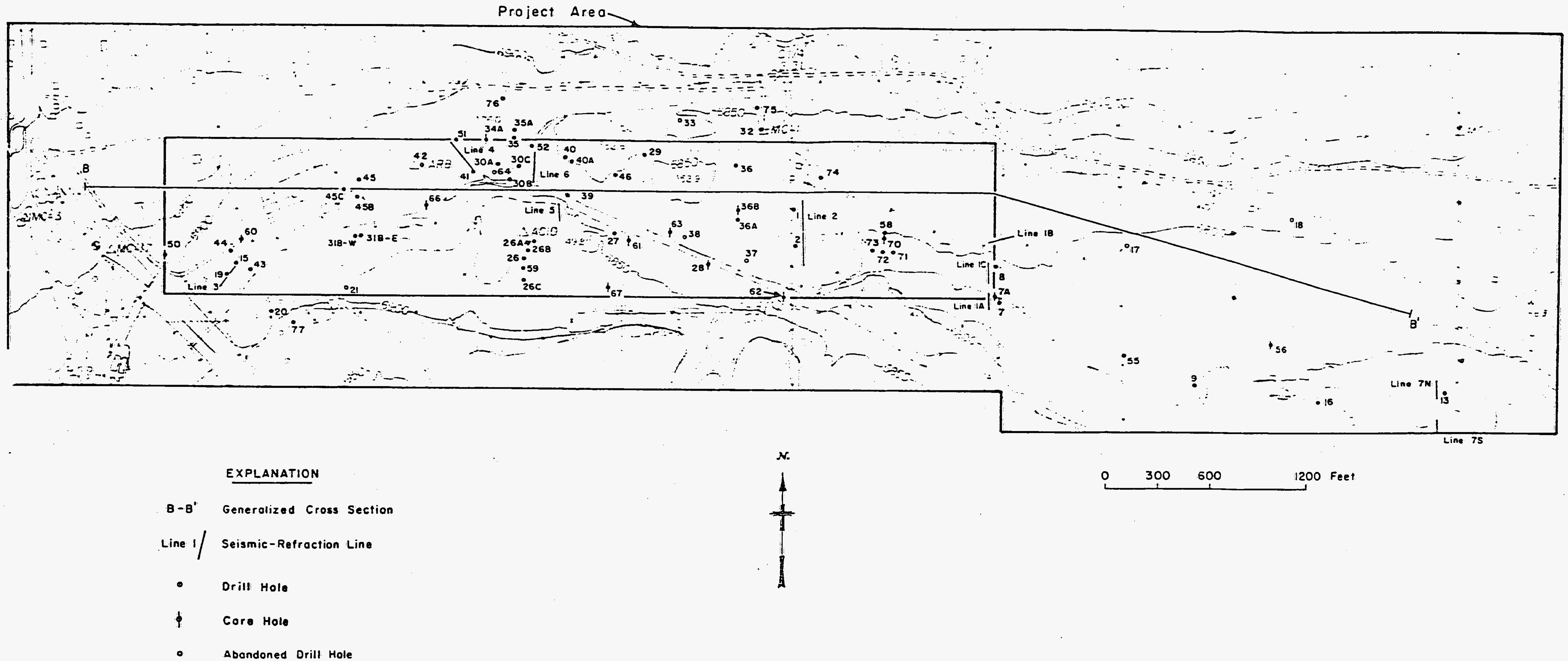

Figure IV-2. Locations of Groundwater Monitoring Wells at the Monticello Millsite

Alluvial Aquifer On Site

The shallow aquifer is contaminated by the mill-tailings piles (Table IV-1). In general, the highest concentrations are found in the vicinity of the carbonate and vanadium piles. Note that the high uranium content of Well 36A on the east side of the east tailings pile is reflected in offsite Well 1 on the private property immediately east of the Government property (Table IV-2).

Table IV-1. Contamination in Shallow Onsite Monitoring Wells

Well	Contaminant Concentration[a]										
	As	Cl	Fe	Mn	Mo	NO_3-N	Ra-226	Se	SO_4	U	V
30A	0.03	46	0.32	2.3	0.09	<1.0	-	0.01	395	0.2	0.74
30B	0.16	113	0.21	2.8	0.47	<1.0	-	0.07	556	0.6	4.3
30C	0.13	67	0.03	2.1	0.37	2.0	<1	0.09	446	0.4	3.8
36A	<0.005	96.5	<0.1	11.8	0.79	15.3	14.5	<0.005	2640	4.4	0.53
40A	0.07	95.7	0.32	3.41	0.35	<0.23	5.3	0.007	594	1.0	0.45
41	2.2	1519	0.06	0.87	33.55	178	-	1.6	3490	4.8	6.5
45B	<0.05	14.1	0.19	0.17	<0.05	7.0	-	<0.005	302	0.02	<0.05

[a]All results are in mg/l except those for Ra-226 which are in pCi/l. Results represent averages where two samplings were made in 1986.

Table IV-2. Contamination in Shallow Offsite Monitoring Wells

Well	Contaminant Concentration[a]								
	As	Fe	Mn	Mo	NO_3-N	Ra-226	Se	U	V
1	0.03	<0.03	4.89	0.53	33.3	<0.2	0.009	3.4	1.07
7	<0.005	<0.03	0.81	0.05	1.0	-	0.01	0.2	0.08
8	<0.005	0.03	0.01	<0.05	4.0	-	0.01	0.1	<0.05
58	0.01	<0.03	0.12	<0.05	27.0	-	0.02	0.4	0.38
9	<0.005	0.15	0.81	0.12	1.0	-	0.01	0.5	<0.05
13	<0.005	0.26	0.16	<0.05	<1.0	-	<0.005	0.5	<0.05

[a]All results are in mg/l except those for Ra-226 which are in pCi/l. Results represent averages where two samplings were made in 1986.

Alluvial Aquifer Downgradient

The shallow-aquifer monitoring wells on the private property east of the Government property are contaminated with uranium, molybdenum, vanadium, and selenium. The data presented in Table IV-2 demonstrate that concentrations of these elements remain high throughout the year. This aquifer is the major water source for the creek during the dry months, often causing the creek to maintain relatively high levels of contamination during those periods. Two of these wells, 9 and 13, are located as far east of the Government property as 1 kilometer and are still significantly contaminated (Table IV-2).

WATER-QUALITY STANDARDS

The Surplus Facilities Management Program Office has directed that the following standards will apply to the surface-water and groundwater quality at Monticello (White, 1983):

- EPA Standards for Remedial Actions at Inactive Uranium Processing Sites (40 CFR Part 192)

- EPA Safe Drinking Water Act (40 CFR Parts 141, 142, and 143)

In addition, Executive Order 12088 mandates that Federal Government facilities comply with State standards. Thus, the Utah Water Pollution Control Act (1978) must also be addressed with respect to remedial action at the Monticello site.

Surface Water

According to the Utah Water Pollution Control Act, Montezuma Creek must be protected for domestic use (class 1C), aquatic life (class 3A), and agricultural use (class 4). The domestic-use classification is a result of drinking water being removed from the San Juan River at the town of Mexican Hat (Reichert, 1983); Montezuma Creek is a tributary of the San Juan.

Table IV-3 compares the average concentrations of the suspected contaminants found in Montezuma Creek with the applicable water-quality standards. Numerical standards have not been promulgated for some of the elements; thus, the potential violation of Utah's aquatic-life and agricultural-use standards is open to interpretation.

A detailed discussion of potential health effects is included in the Draft Environmental Assessment for the Monticello Millsite (Bendix Field Engineering Corporation, 1985). The paragraphs that follow evaluate the concentrations of individual elements found in the surface water with respect to the relevant numerical standards.

Uranium - The State of Utah has established a standard of 15 pCi/l gross alpha for class 1C waters. Results of analyses of Montezuma Creek demonstrate that uranium is the only alpha emitter found in significant concentrations. Gross alpha, based only on the uranium contamination contributed by the piles, usually exceeds the standard by at least a factor of six for up to 10

Table IV-3. Comparison of Montezuma Creek Contamination and Relevant Water-Quality Standards

Source	Contaminant Concentration (mg/l)[a]							
	As	Fe	Mn	Mo	NO_3-N	Se	U	V
MONTEZUMA CREEK CONTAMINATION								
Background (Site W-3)	<0.005	<0.03	<0.017	<0.05	3.0	<0.005	<0.003	<0.05
Site W-4	<0.005	<0.03	<0.035	<0.05	3.5	0.016	0.10	0.221
Sorenson Site	<0.005	<0.03	0.051	0.057	3.0	0.007	0.20	0.105
WATER-QUALITY STANDARDS								
Utah: Domestic Use (1C)	0.05	b	c	c	10	0.01	c	c
Utah: Aquatic Life (3A)	b	1.0	c	c	c	0.05	c	c
Utah: Agriculture (4)	0.1	b	c	c	c	0.05	c	c
Safe Drinking Water Act	0.05	c	c	c	10	0.01	c	c

[a]Results represent averages for samples collected during two monitoring trips in June and October 1986.

[b]Insufficient evidence to warrant establishment of a numerical standard; limits are assigned on a case-by-case basis (State of Utah, 1978).

[c]No legal guidance.

kilometers downstream from the site. However, after approximately 6.5 kilometers, there is a natural contribution from the Morrison Formation.

Arsenic Arsenic contamination has been detected as far downstream as the Sorenson site. However, no arsenic was detected in 1986.

Selenium In previous years, selenium concentrations usually exceeded the standards for the first 3 kilometers downstream from the site. In 1986, selenium occured at concentrations at or below the numeric standards.

Radium-226 Radium-226 contamination has not been detected in any of the Montezuma Creek samples collected over the past year.

Molybdenum and Vanadium - Neither of these elements is subject to specific numerical standards. However, prior to 1985, both were found in concentrations which may impair agricultural use.

Others - No other inorganic species are found in concentrations exceeding applicable State or Federal standards.

Groundwater

In general, contamination in the shallow aquifer is greater than that found in Montezuma Creek (cf. Tables IV-1 and IV-2). Thus, the water is probably unfit for agricultural use. According to the Utah Water Pollution Control Act (1978), the class 1C designation applies if an aquifer contains "a sufficient quantity [of water] to supply a public system." Since all of the shallow wells yield only small amounts of water, the class 1C designation is not applicable to the shallow aquifer at Monticello.

Summary

As in years prior to 1985, the State of Utah standards for surface water were exceeded in Montezuma Creek as a result of contamination from the tailings piles. The shallow aquifer remains contaminated, but contains too little water to have any potential for beneficial use.

AIR QUALITY

RADON FLUX AND ATMOSPHERIC TRANSPORT

Extensive measurements of radon contamination from the tailings piles were conducted during 1984. These include on-pile, site-boundary, and off-site Track Etch® measurements, as well as additional on- and off-pile radon-flux measurements. Results of these measurements are presented in detail in the *Draft Environmental Assessment for the Monticello Millsite* (Bendix Field Engineering Corporation, 1985). The data demonstrate that the EPA standard for radon emissions from inactive uranium processing sites is exceeded at all four tailings piles at the Monticello site.

AIR PARTICULATES

The background particulate burden in the Monticello area can be inferred from information gathered at rural sites throughout the western United States (Flocchini and others, 1981; Hall, 1981; Korte and Moyers, 1978; Mesa County, Colorado, Health Department, 1979). In two of these studies (Flocchini and others and Mesa County, Colorado, Health Department), data were collected within 50 to 100 miles of Monticello. Results of all of the investigations demonstrate that the average particulate mass in western, rural, high-desert locations is 15 to 25 $\mu g/m^3$. These studies agree that most of the particulate mass is soil material, with only minor contributions of anthropogenic origin. However, determination of contaminants related to uranium mill tailings was not addressed in any of these investigations.

Van De Steeg and others (1982) describe the concentration and distribution of radionuclides in airborne particulates from the Ambrosia Lake uranium district in New Mexico. Average concentrations at background locations were approximately 5 to 10 $\mu g/m^3$ of U-238 and 0.1 to 0.5 pCi/m^3 of Ra-226. These values represent the closest approximation of a historical record for Monticello.

Sampling Method and Results

Inhalable particulate samplers based on the design by Wedding (1982) were installed at the Monticello site. The samplers are Sierra-Anderson Series 300, equipped with constant-flow controllers, mechanical timers, and Series-320-size selective inlets. Flow-rate calibration is accomplished with a Kurz Model 341 electronic mass flowmeter.

Samplers were operated at 40 cubic feet per minute (cfm) for 24 hours, running midnight-to-midnight every sixth day. Sample-collection media are Whatman Number 41 cellulose filters.

Wind-rose data collected on site have clearly identified two principal wind vectors in the area, one to the east and one to the north. Thus, sampling stations were located along these two directions as well as at a background site.

The background site is located approximately 0.8 kilometer west of the City of Monticello near the pumphouse building for the city water supply. The intake port for this sampler is 3 meters above ground level. The area west of this site is mostly natural desert and mountainous terrain. There are no nearby industrial activities.

The east site is located on the eastern edge of the east tailings pile. The sampler was placed on a steel tower such that the intake was mounted approximately 3 meters above ground level.

The north site is located on the west side of the City of Monticello cemetery grounds. This location is 300 meters north of the tailings area at an elevation 100 meters above the piles. The sampler intake is 4 meters above ground level.

Air-particulate sampling for 1986 was initiated on 9 May. (Sampling had been suspended during the period November 1985 to May 1986 due to inclement weather.) A total of 68 samples were collected in 1986. Of these samples, only three contained radium-226 concentrations above detection limits. Two of the samples were collected at the east site and one at the north site; all detected radium-226 concentrations were near detection limits. Uranium was not detected at any of the sampling sites. Additional cover on the piles, resulting from cleanup of Monticello vicinity properties, may have had some effect on the decrease of airborne contaminants observed during the 1985 and 1986 monitoring season as compared with the higher 1984 values (Korte and Wagner, 1985).

POTENTIAL HEALTH EFFECTS

Population dose commitments and potential toxic effects of nonradiologic contaminants associated with the Monticello site are discussed in the *Draft Environmental Assessment for the Monticello Millsite* (Bendix Field Engineering Corporation, 1985). Results indicate that detrimental radiologic health effects are indistinguishable from those resulting from background.

Although contaminant levels were low in 1986, there is some potential for toxic effects from nonradiologic contaminants in the shallow unconfined aquifer and in Montezuma Creek. However, there have been no incidents reported. The potential for toxicity was derived from a comparison of contaminant levels with recommended safe limits as published in the technical literature (e.g., National Academy of Sciences, 1972). For example, the molybdenum concentration in Montezuma Creek for the first 2 kilometers downstream typically exceeds suggested limits for dairy cattle intake and recommended limits for irrigation water. Selenium concentrations generally exceed the suggested limits for protection of dairy cattle and frequently exceed limits for irrigation water. Vanadium concentrations regularly exceed suggested limits for the protection of dairy cattle, aquatic life, and irrigation water. The suggested limits for beef cattle are also exceeded at times. Since the creek is used both for irrigation and for watering livestock, the potential for toxic effects merits further study.

CONCLUSIONS

Hydrologic conditions at Monticello result in the movement of contaminants into the underlying alluvial aquifer and downgradient from the tailings area. Remedial action will address the extensive contamination in Montezuma Creek. This contamination exceeds numerical standards set by the State of Utah and extends for at least 6.5 kilometers downstream from the millsite.

Section V

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Appendix A

ANALYTICAL DATA SETS FOR WATER SAMPLES FROM GRAND JUNCTION PROJECTS OFFICE FACILITY AND MONTICELLO MILLSITE

This appendix presents analytical results of the groundwater monitoring program conducted at the Grand Junction Projects Office facility and the Monticello millsite. Determinations were made by the UNC Chemistry Laboratory. Below detection limits is designated by a minus sign (-), except in Eh values.

Table A-1. Analytical Data Set for Water Samples From Grand Junction Projects Office Facility and Gunnison River, January 1986

Location	Concentration (mg/l) Na	K	Ca	Mg	Cl	SO_4	NO_3	PO_4	As	Mo	Se	V	U	Specific Conductance (μmho/cm)[a]	pH	Eh (mV)[a]	Temp (°C)	Alkalinity $CaCO_3$ (mg/l)
1-9SA	360	8.06	146	24.8	42.3	928	-1	-0.1	-0.01	0.01	-0.005	-0.01	0.062	1800	7.9	+125	15.5	259
1-9SB	304	8.94	218	56.2	54.6	1040	24.0	-0.1	-0.01	0.02	0.049	-0.01	0.5	1860	7.35	+160	14.5	271
10-2NA	830	16.2	491	214	188	3010	308	0.9	-0.01	0.28	0.064	-0.01	2.7	4380	7.1	+160	15.5	479
10-2NB	590	14.3	429	139	190	2300	91.6	0.1	-0.01	0.51	0.054	-0.01	2.4	3240	7.1	+180	15.5	401
11-12NA	361	9.68	244	73.6	140	1070	67	0.1	0.049	0.04	0.045	0.19	0.4	2275	7.1	+150	12.5	391
11-12NB	358	9.56	242	73.8	142	1070	69.1	0.1	0.037	0.04	0.045	0.18	0.5	2244	7.05	+160	12	380
12-7NA	214	14.5	196	42.0	174	513	-1	6.9	0.03	0.01	-0.005	-0.01	0.002	1696	7.0	-80	13	446
12-7NB	214	14.6	207	42.8	175	527	-1	6.8	0.03	-0.01	-0.005	-0.01	0.002	1674	7.0	-110	14	443
13-10N	455	19.1	401	53.2	189	1620	3	0.2	0.08	0.89	-0.005	0.17	2.0	2688	7.05	+160	13	405
17-13N	123	3.68	85.2	24.6	9.5	418	-1	-0.1	-0.01	0.03	-0.005	-0.01	0.043	910	7.4	+100	12.5	168
3-3NB	527	10.2	268	69.8	141	1610	23.3	0.1	-0.01	-0.01	0.033	-0.01	0.041	2583	7.5	+145	14.5	243
3-3S	656	9.66	268	100	197	1840	73.7	-0.1	-0.01	0.01	0.063	0.01	0.080	3038	7.3	+160	14.5	279
5-12NA	391	7.30	362	133	225	1570	5	-0.1	-0.01	-0.01	-0.005	-0.01	0.059	2565	7.35	+175	11	348
5-12NB	390	7.58	353	131	230	1650	12.1	-0.1	-0.01	-0.01	0.014	-0.01	0.056	2640	7.0	+160	12	368
6-2N	311	9.64	281	81.8	111	1230	72.2	-0.1	-0.01	0.10	0.085	0.01	0.6	2156	7.5	+170	14	289
7-6S	258	6.06	188	74.0	63.7	779	77.1	-0.1	-0.01	0.19	0.074	0.01	1.4	1792	6.8	+150	13	384
9-6N	268	7.06	185	80.0	102	773	80.6	0.4	-0.01	0.02	0.021	-0.01	0.3	1853	7.15	+145	20.5	410
Dike Ditch	284	24.9	199	56.0	64.1	1110	-1	-0.1	-0.01	0.43	-0.005	-0.01	1.7	1716	7.2	+190	5	213
GJ84-1	229	15.9	181	34.8	143	427	-1	4.2	0.33	-0.01	-0.005	-0.01	0.003	1664	7.2	-90	13	473
GJ84-12	404	19.9	428	66.8	208	1630	16.1	0.3	0.067	0.54	-0.005	0.20	1.8	2880	7.1	+115	13	407
GJ84-2	744	11.7	213	25.4	130	1670	-1	0.2	0.28	0.03	-0.005	0.01	0.057	2976	7.3	-50	14	404
GJ84-3	477	20.4	376	77.4	200	1590	26.7	0.3	0.046	0.33	-0.005	0.17	0.8	3136	7.1	+125	13	381
GJ84-4	1120	16.6	385	71.8	226	2920	-1	-0.1	-0.01	0.35	-0.005	-0.01	1.2	3350	7.2	+130	11.5	475
GJ84-5	1350	18.9	428	170	392	3640	-1	-0.1	-0.01	0.18	-0.005	-0.01	0.7	5198	7.2	+10	11	514
GJ84-6	201	4.26	176	57.6	152	686	-1	-0.1	-0.01	0.02	-0.005	-0.01	0.020	1518	7.3	+160	12	217
GJ84-7	938	11.6	514	189	502	2920	-1	-0.1	-0.01	-0.01	-0.005	-0.01	0.063	4590	6.95	-25	11	517
GJ84-8	920	8.44	106	26.2	40.1	2100	-1	-0.1	-0.01	0.02	-0.005	-0.01	0.015	2985	7.65	+140	13.5	334
GJ84-9	430	8.70	137	20.4	25.7	1020	-1	-0.1	-0.01	0.01	-0.005	-0.01	0.012	1943	7.4	-50	11.5	233
Gunnison (D)[b]	34.0	2.32	60.8	21.8	5.6	186	3	-0.1	-0.01	-0.01	-0.005	-0.01	0.005	415	8.0	+130	2.0	129
Gunnison (U)[b]	33.0	2.30	59	21.8	5.5	187	3	-0.1	-0.01	-0.01	-0.005	-0.01	0.005	413	8.1	+180	2.5	117
North Pond	1130	29.2	259	196	411	3300	3	-0.1	-0.01	0.06	-0.005	-0.01	0.7	3900	7.6	+190	5	223
North Well	166	16.3	112	16.6	35.9	474	-1	1.3	0.45	0.05	-0.005	0.01	0.035	1215	7.05	-60	11	197
P-1A	325	6.74	183	37.4	64.3	979	3	-0.1	-0.01	0.39	0.043	-0.01	1.2	1696	7.75	+170	13	283
P-1A	322	6.84	180	37.8	66.1	971	3	-0.1	-0.01	0.39	0.044	-0.01	1.3	1696	7.75	+170	13	283
P-10	406	10.8	422	100	134	1870	3	-0.1	-0.01	0.46	0.044	0.30	3.6	2880	6.9	+190	13	319
P-4A	1450	25.7	399	249	510	4080	-1	-0.1	-0.01	0.06	-0.005	-0.01	0.2	5738	7.25	+100	11	424
P-6	414	7.84	120	22.4	70.0	890	18.9	0.1	-0.01	0.02	-0.005	-0.01	0.098	1782	7.7	+170	12	283
P-8	326	8.88	224	79.6	133	992	94.1	0.5	0.020	0.02	0.035	0.12	0.4	2108	7.05	+160	14	394
South Well	211	16.1	183	44.8	109	733	-1	5.6	0.14	-0.01	-0.005	0.02	-0.1	1600	7.1	-115	13	303
Gunnison (M)[b]	32	2.32	58.8	21.8	5.7	187	3	-0.1	-0.01	-0.01	-0.005	-0.01	0.005	402	8	+190	3	127
South Pond	155	8.06	38.4	15.8	140	235	-1	1.3	-0.01	-0.01	-0.005	-0.01	0.1	1001	9.3	+170	5.5	84
GJ84-10	399	5.24	141	30.0	101	1060	-1	-0.1	-0.01	-0.01	-0.005	-0.01	0.008	2125	7.7	+80	14	155
GJ84-11	146	2.70	81.6	23.8	7.6	169	-1	0.2	-0.01	-0.01	-0.005	-0.01	0.006	990	7.15	+30	12	449
P-2A	457	11.2	409	115	304	1860	4	-0.1	-0.01	-0.01	-0.005	-0.01	0.048	2625	7.5	+160	14	235
P-3A	335	9.44	195	39.4	54.0	1040	-1	-0.1	-0.01	0.16	-0.005	-0.01	0.5	1980	7.05	-30	12	327
P-7	1140	16.6	469	105	304	3150	-1	0.1	-0.01	0.30	-0.005	-0.01	1.6	4615	7.3	-70	12.5	515
P-9	50.4	3.06	112	28.8	7.4	249	-1	-0.1	-0.01	0.19	-0.005	0.06	0.2	813	7.0	+40	14	235
3-3NA	474	10.3	315	58.0	130	1640	-1	-0.1	-0.01	-0.01	-0.005	-0.01	0.039	2375	7.65	+140	14	224
8-4S	464	10.6	437	98.2	135	1990	11.8	0.2	-0.01	1.48	0.224	0.66	2.8	3105	6.9	+180	11	339
8-4S	463	10.5	439	97.8	131	1960	13.7	-0.1	-0.01	1.45	0.224	0.66	2.6	3105	6.9	+180	11	339
8-4S	462	10.6	422	97.0	130	1970	13.8	0.2	-0.01	1.48	0.232	0.70	2.1	3105	6.9	+180	11	339
10-19N	1580	22.6	485	238	522	4380	-1	-0.1	-0.01	0.16	-0.005	-0.01	1.3	7260	7.3	-80	12	572
11-1S	710	13.3	357	156	129	2510	76.5	-0.1	-0.01	0.24	0.039	0.01	1.7	3782	7.05	+160	15	361
11-15N	1200	16.7	530	178	503	3500	1	0.1	-0.01	0.23	-0.005	-0.01	1.5	5805	7.1	+50	11	659
13-16A, South	2010	21.8	452	153	410	3020	-1	0.2	0.03	0.02	-0.005	-0.01	0.3	7425	6.9	-390	11	2915
13-16B, North	1170	21.2	389	98.4	258	3040	3	0.2	-0.01	0.31	-0.005	0.03	1.1	5280	7.1	-320	12	725
14-6NA	103	13.0	54.4	11.8	12.4	206	10	0.9	0.190	0.05	-0.005	0.02	0.046	558	7.2	+140	13.5	196
14-6NB	214	15.2	145	30.0	81.3	490	-1	0.5	0.175	0.04	-0.005	0.08	0.3	1460	7.0	-50	13.5	349
14-13NA	514	18.3	340	72.8	174	1640	6	0.1	0.01	0.43	-0.005	0.02	1.3	2938	7.0	+100	14	417
14-13NB	444	12.2	272	70.6	158	1350	16.8	-0.1	-0.01	0.36	-0.005	0.03	0.9	2711	7.05	+50	10	390
15-17N	1040	15.0	302	70.0	185	2570	-1	-0.1	-0.01	0.31	-0.005	-0.01	1.6	4375	7.3	-150	14	516
17-13N	124	3.78	89.4	25.0	9.7	405	-1	-0.1	-0.01	0.03	-0.005	-0.01	0.043	910	7.4	+100	12.5	168

[a]Where μmho/cm = micromho per centimeter; mV = millivolt.
[b]Gunnison River sampling location: D = downstream, U = upstream, M = mid-facility.

Table A-2. Analytical Data Set for Water Samples From Grand Junction Projects Office Facility and Gunnison River, April 1986

Location	Concentration (mg/l) Na	K	Ca	Mg	Cl	SO_4	NO_3	PO_4	As	Mo	Se	V	U	Specific Conductance (μmho/cm)[a]	pH	Eh (mV)[a]	Temp (°C)	Alkalinity $CaCO_3$ (mg/l)
1-9SA	367	8.04	148	23.2	47.6	925	-1	-0.10	-0.01	-0.01	-0.005	-0.01	0.5	1980	7.75	+160	15.5	264
1-9SB	267	7.92	225	74.0	62.3	1060	51	-0.10	-0.01	-0.01	0.039	-0.01	0.5	2140	7.4	+145	13	275
10-2NA	700	13.5	320	152	157	2330	88	0.65	-0.01	0.406	0.058	-0.01	2.1	3900	7.05	-155	15.5	389
10-2NB	576	14.3	419	136	175	2260	72	-0.10	-0.01	0.552	0.069	-0.01	3.0	3720	7.15	-160	15	375
11-12NA	362	9.52	247	77.4	140	1230	66	0.27	0.034	0.026	0.035	0.184	0.4	2540	6.9	-160	14	377
11-12NB	348	9.14	243	74.6	132	1110	72	0.28	0.037	0.022	0.038	0.169	0.4	2570	7.15	+150	12	364
11-15N	1450	19.7	471	187	495	3820	3	-0.10	-0.01	0.285	-0.005	-0.01	1.4	6750	6.9	-30	11	580
11-1S	448	8.96	192	77.2	81.0	1390	6	-0.10	-0.01	0.284	-0.005	-0.01	0.5	2730	7.25	+140	12.5	273
12-7NA	236	14.4	212	37.2	166	335	-1	4.5	0.150	-0.01	-0.005	0.01	0.004	1650	6.8	-120	13.5	498
12-7NB	237	13.8	222	37.6	166	338	-1	4.9	0.132	-0.01	-0.005	-0.01	0.004	1660	7.0	-140	13	478
13-16NB	1180	19.7	306	80.8	228	2710	1	-0.10	-0.01	0.427	-0.005	0.020	1.3	5280	7.1	-30	12	620
14-13NA	531	17.3	361	77.8	178	1820	-1	-0.10	-0.01	0.452	-0.005	0.014	1.3	3320	7.25	-50	14.5	427
14-13NB	722	14.4	398	78.8	200	1920	1	-0.10	-0.01	0.518	-0.005	0.027	0.2	3780	7.3	-30	13	452
14-6NA	137	14.0	73.6	17.2	35.9	266	-1	0.39	0.21	0.044	-0.005	0.013	0.1	1060	6.9	-120	12	282
14-6NB	189	11.9	125	20.0	47.7	338	-1	0.23	0.12	0.055	-0.005	0.095	0.3	1220	6.9	-110	11	334
3-3S	610	9.52	265	94.2	179	1810	73	-0.10	-0.01	0.028	0.065	-0.01	0.089	3510	7.3	+155	17	293
6-2N	311	9.54	241	79.2	119	1170	70	-0.10	-0.01	0.093	0.089	-0.01	0.5	2390	7.45	+165	18	300
7-6S	257	5.50	192	64.0	55.7	766	40	-0.10	-0.01	0.239	0.048	-0.01	1.6	1810	6.8	+130	13.5	382
8-4S	417	10.7	395	101	156	1930	8	-0.10	-0.01	0.748	0.032	0.592	2.3	3350	6.7	+180	11.5	395
9-6N	320	7.94	232	98.4	133	1170	107	0.40	-0.01	0.020	0.033	0.011	0.004	2470	7.1	+150	22.5	365
GJ84-1	213	15.6	240	36.8	135	519	-1	3.9	0.24	-0.01	-0.005	0.010	0.006	1780	7.0	-100	14.5	448
GJ84-10	418	4.80	108	25.4	99.6	982	-1	-0.10	-0.01	-0.01	-0.005	-0.01	5.7	2100	7.2	+165	15.5	168
GJ84-11	186	3.52	133	41.8	17.6	421	-1	-0.10	-0.01	-0.01	-0.005	-0.01	0.011	1410	6.9	+155	14.5	540
GJ84-2	285	18.1	237	27.0	146	611	-1	-0.10	0.16	0.023	-0.005	-0.01	0.1	1890	6.8	-100	12	424
Gunnison (U)[b]	21.6	2.04	41.4	13.6	3.5	94.3	2	-0.10	-0.01	-0.01	-0.005	-0.01	-0.003	302	7.4	+140	9.5	65
North Pond	1160	29.8	265	201	421	3120	2	-0.10	-0.01	0.072	0.005	-0.01	0.8	5020	8.15	+200	14	230
P-10	315	8.68	285	70.4	95.5	1360	-1	-0.10	-0.01	0.441	-0.005	0.267	0.8	2510	6.9	+160	12	302
P-2A	476	11.9	444	127	358	2070	10	-0.10	-0.01	0.016	0.012	-0.01	0.067	3320	7.5	+160	14.5	223
P-3A	196	5.90	124	20.8	16.8	529	-1	-0.10	-0.01	0.081	-0.005	-0.01	1.2	1320	7.2	-70	12	242
P-3B	419	12.1	400	98.2	52.5	1700	-1	-0.10	-0.01	0.058	-0.005	-0.01	1.2	2950	7.1	-110	10.5	408
P-6	382	7.02	100	18.4	47.7	841	-1	-0.10	-0.01	0.027	-0.005	-0.01	0.088	1860	7.65	+155	13	287
P-7	1180	16.3	411	95.4	259	3040	-1	-0.10	-0.01	0.401	-0.005	-0.01	0.029	5080	7.1	+170	14	550
P-8	363	9.32	239	89.2	142	1180	61	0.35	0.018	0.033	0.032	0.117	0.5	2480	7.25	+150	14	373
P-9	40.0	2.36	118	24.2	4.7	144	-1	-0.10	-0.01	0.135	-0.005	0.070	-0.003	630	6.8	+60	10.5	270
South Pond	219	11.3	59.8	14.2	245	289	-1	0.33	0.017	0.027	-0.005	0.016	0.1	1350	10.4	+100	14.5	72
South Well	191	14.5	72.7	40.2	110	623	-1	5.0	0.097	-0.01	-0.005	-0.01	0.005	1680	7.2	-132	11.5	323
Gunnison (D)[b]	22.2	2.06	41.3	13.9	3.5	95.1	2	-0.10	-0.01	-0.01	-0.005	-0.01	-0.003	462	7.8	-180	7	118
Gunnison (M)[b]	22.8	2.03	41.4	13.6	5.4	101	4	-0.10	-0.01	-0.01	-0.005	0.012	-0.003	366	7.3	+160	9	125
Dike Ditch	221	19	98	32.4	37.9	588	-1	0.19	0.043	0.590	0.011	-0.01	0.7	1460	8.2	+155	13.5	196
Dike Ditch	225	18.9	98.8	32.2	38.3	637	-1	0.11	0.039	0.605	0.010	-0.01	0.8	1460	8.2	+155	13.5	196
P-1A	332	6.96	199	42.4	72.8	1000	22	-0.10	-0.01	0.536	0.075	-0.01	2.1	2120	7.65	+185	14.5	290
P-4A	1400	22.8	387	237	478	3950	-1	-0.10	-0.01	0.048	-0.005	-0.01	0.3	6100	7.4	-20	15	430
3-3NA	469	10.4	297	55.4	117	1640	-1	-0.10	-0.01	-0.01	-0.005	-0.01	0.034	2990	7.7	-90	15	235
3-3NB	501	9.56	243	65.4	123	1510	22	-0.10	-0.01	-0.01	0.026	-0.01	0.040	2910	7.65	-50	14	259
5-12NA	418	7.38	345	130	206	1580	9	-0.10	-0.01	-0.01	0.015	-0.01	0.064	3110	7.25	-150	15	385
5-12NB	383	7.46	339	125	201	1460	11	-0.10	-0.01	-0.01	0.020	-0.01	0.068	3050	7.3	+125	13.5	365
13-10N	415	19.2	361	56.2	179	1470	5	0.13	0.048	0.725	-0.005	0.079	1.8	2860	7.05	+160	12.5	391
GJ84-3	401	18.9	380	68	193	1550	6	0.20	0.074	0.635	-0.005	0.227	1.5	2990	7.05	+155	13.5	433
GJ84-6	246	5.32	288	99.6	172	1250	-1	-0.10	-0.01	-0.01	-0.005	-0.01	0.040	2440	7.2	+145	15	252
GJ84-7	1170	12.7	546	228	677	3600	-1	-0.10	-0.01	-0.01	-0.005	-0.01	0.100	6350	7.2	-10	13.5	603
GJ84-12	357	17.9	393	51.4	174	1390	2	-0.10	0.062	0.733	-0.005	0.156	1.5	2680	7.1	+160	15	400
North Well	132	12.8	73.8	11.2	16.6	364	-1	0.98	0.318	0.051	-0.005	-0.01	0.028	891	7.0	-65	10.5	167
GJ84-4	1000	12.7	248	54.6	207	2250	-1	-0.10	-0.005	0.225	-0.005	-0.01	0.900	4224	7.3	+150	12	429
GJ84-5	915	12.1	189	75.4	129	2060	-1	-0.10	-0.005	0.099	-0.005	-0.01	0.500	3900	7.4	+160	11.5	397
GJ84-8	358	7.86	70.6	19.2	39	1620	-1	-0.10	-0.005	0.011	-0.005	-0.01	0.018	3300	7.7	+130	13.5	329
GJ84-9	426	8.44	147	20.4	33.8	1080	-1	-0.1	-0.005	-0.01	-0.005	-0.01	0.016	2196	7.5	+40	15	245
17-13N	101	3.12	65.2	20.0	8.3	343	-1	-0.1	0.014	-0.01	-0.005	-0.01	0.036	326	7.7	+130	13.5	128
10-19N	1460	19.1	436	192	452	3990	-1	-0.1	0.073	0.190	-0.005	-0.01	1.200	6175	7.2	-40	12.5	561
15-17N	1230	16.2	318	76.8	234	3020	-1	-0.1	0.078	0.354	-0.005	-0.01	1.200	4750	7.25	-150	13	498
13-16NA	1760	20.8	357	108	316	3130	-1	0.29	-0.005	-0.01	-0.005	0.024	0.200	6400	10.7	-315	15	1506

[a]Where μmho/cm = micromho per centimeter; mV = millivolt.
[b]Gunnison River sampling location: D = downstream, U = upstream, M = mid-facility.

Table A-6. Analytical Data Set for Water Samples from Grand Junction Projects Office Facility and Gunnison River, July 1986

Location	Concentration (mg/l) Na	K	Ca	Mg	Cl	SO_4	NO_3	PO_4	As	Mo	Se	V	U	Specific Conductance (μmho/cm)[a]	pH	Eh (mV)[a]	Temp (°C)	Depth to H_2O (ft)	Alkalinity $CaCO_3$ (mg/l)
1-9SA	434	10	201	37	60.4	1090	55	-0.1	-0.005	0.050	0.047	-0.050	0.1	2981	7.0	-50	16.5	12.17	282
1-9SA	437	10	206	37	61.4	1130	54	-0.1	-0.005	-0.050	0.050	-0.050	0.112	2981	7.0	-50	16.5	12.17	282
1-9SB	293	8.6	362	114	87.6	1370	226	-0.1	-0.005	-0.050	0.063	-0.050	1.0	3538	6.5	+70	17	11.70	380
10-2NA	605	12	235	104	104	1700	46	0.6	-0.005	0.44	0.030	-0.050	1.0	3739	6.6	-60	16	10.8	284
10-2NB	539	13	340	106	125	1810	35	-0.1	-0.005	0.70	0.062	-0.050	2.7	2413	6.4	+65	16	10.7	336
11-1S	179	3.1	34	14	12.6	325	-1	-0.1	-0.005	0.17	-0.005	-0.050	0.2	1295	8.2	-220	13	15.40	180
11-12NA	406	10	275	81	133	1210	71	0.3	0.027	0.070	0.041	0.17	0.4	2895	6.2	+20	16	3.72	363
11-12NA	409	10	279	87	140	1200	69	0.3	0.026	0.070	0.043	0.18	0.2	2895	6.2	-20	16	3.72	363
11-12NB	408	11	274	82	143	1200	45	0.2	0.026	0.070	0.045	0.18	0.3	2935	6.2	0	19	3.75	366
11-15N	1380	18	582	184	517	4190	-1	-0.1	-0.005	0.41	-0.005	-0.050	1.4	926	5.8	-50	15	4.75	621
12-7NA	177	15	164	27	166	293	-1	4.8	0.13	-0.050	-0.005	-0.050	-0.003	2073	6.2	-100	13	6.53	363
12-7NB	181	15	165	37	175	290	-1	4.6	0.12	-0.050	-0.005	-0.050	-0.003	1179	6.3	-40	17	7.1	368
13-10N	502	19	310	42	126	1370	-1	0.1	0.073	1.1	-0.005	0.12	1	3395	6.4	+100	15	5.62	278
13-16N	936	19	285	68	195	2360	-1	-0.1	-0.005	0.45	-0.005	-0.050	1.3	5436	6.85	+10	14	4.63	502
14-13NA	611	20	420	82	187	2020	-1	-0.1	0.008	0.57	-0.005	-0.050	0.8	3860	6.2	+10	16	5.99	449
14-13NA	635	19	419	84	190	2020	-1	-0.1	0.006	0.46	-0.005	-0.050	0.9	3860	6.2	+10	16	5.99	449
14-13NB	736	14	268	66	164	1880	-1	-0.1	0.006	0.74	-0.005	-0.050	1.1	4420	6.4	-20	20	6.71	352
14-6NA	86	11	44	10	7.2	152	-1	1.1	0.17	0.050	-0.005	-0.050	0.051	663	6.2	-20	16	15.26	192
14-6NB	85	7.3	41	10	4.1	156	-1	0.4	0.088	0.060	-0.005	0.090	0.083	632	6.2	-30	14	15.61	246
3-3S	504	9.2	232	82	120	1460	66	-0.1	-0.005	-0.050	0.059	-0.050	0.055	3691	6.8	+40	18	11.40	138
3-3S	491	9.3	228	82	117	1440	67	-0.1	-0.005	-0.050	0.056	-0.050	0.057	3691	6.8	+40	18	11.40	138
3-3NA	509	11	291	59	105	1560	-1	0.2	-0.005	-0.050	-0.005	-0.050	0.028	3642	7.1	+60	15	10.42	235
3-3NB	518	10	230	71	114	1500	28	-0.1	-0.005	-0.050	0.029	-0.050	0.037	3498	7.0	+25	16	10.23	270
5-12NA	425	7.5	332	125	194	1460	3	-0.1	-0.005	-0.050	0.014	-0.050	0.048	3518	6.8	+100	18	7.83	430
5-12NB	417	8.2	342	128	211	1460	7	-0.1	-0.005	-0.050	0.018	-0.050	0.044	3800	6.8	+100	16	7.50	400
6-2N	311	9.2	251	80	96.1	1060	77	0.1	-0.005	0.12	0.10	-0.050	1.0	2771	7.2	+50	17	12.15	314
7-6S	108	2.4	52	21	10.2	247	-1	-0.1	-0.005	0.22	0.006	-0.050	0.3	948	6.2	-10	14	17.16	175
8-4S	473	12	418	105	146	1820	8	0.1	0.006	0.88	0.026	1.0	1.4	3827	5.0	+30	15	4.65	327
9-6N	496	11	336	129	156	1660	105	0.7	-0.005	-0.050	0.042	-0.050	0.4	3848	6.5	+50	17.5	10.46	358
Dike Ditch	195	19	82	29	20.8	289	3	4.0	0.18	0.16	-0.005	0.050	0.2	1472	7.95	+150	26		420
GJ84-1	220	18	210	42	114	660	-1	3.8	0.30	-0.050	-0.005	-0.050	-0.003	1554	6.3	-50	13	6.75	387
GJ84-10	467	3.6	104	24	102	982	-1	-0.1	-0.005	-0.050	-0.005	-0.050	0.006	2593	6.4	+30	16	34.48	216
GJ84-11	202	2.9	144	43	16.0	357	-1	-0.1	-0.005	-0.050	-0.005	-0.050	0.008	1636	5.95	-20	15	27.39	620
GJ84-12	482	21	355	57	160	1400	8	0.2	0.042	0.77	0.006	0.25	1.0	3257	6.2	+100	16	5.38	397
GJ84-2	333	18	189	25	130	680	-1	-0.1	0.28	-0.050	-0.005	-0.050	0.040	2523	6.3	-85	12	1.46	429
GJ84-3	456	20	368	72	165	1400	20	0.2	0.038	0.45	0.016	0.22	0.7	2740	6.3	+110	17.5	5.61	412
GJ84-6	288	5.5	400	131	170	1510	2	-0.1	-0.005	-0.050	0.008	-0.050	0.047	3518	6.8	+20	15	12.4	194
GJ84-7	1410	14	606	232	1210	3450	-1	0.4	-0.005	-0.050	-0.005	-0.050	0.079	7772	6.7	-70	13	12.16	415
Gunnison (D)[b]	22	1.6	39	15	3.1	136	7	-0.1	-0.005	-0.050	-0.005	0.050	0.003	431	7.8	+150	20		107
Gunnison (M)[b]	22	1.6	52	15	3.1	135	6	-0.1	-0.005	-0.050	-0.005	0.050	0.003	453	7.8	+150	20		138
Gunnison (M)[b]	22	1.6	52	14	3.2	137	6	-0.1	-0.005	-0.050	-0.005	-0.050	-0.003	453	7.8	+150	20		138
Gunnison (U)[b]	24	1.6	57	16	3.4	140	13	-0.1	-0.005	-0.050	-0.005	0.050	0.003	450	7.9	+150	18		104
North Pond	1390	40	314	266	504	3990	1	-0.1	0.010	0.080	-0.005	0.050	0.7	9449	7.9	+160	22.5		237
North Well	120	14	64.6	10	9.7	293	-1	0.9	0.36	-0.050	-0.005	0.050	0.020	965	6.6	-80	16	4.90	420
P-1A	430	7.8	250	52	63.7	1170	21	-0.1	-0.005	0.63	0.33	0.050	1.5	3136	7.1	+50	16	9.95	322
P-10	118	3.4	64	18	11.9	291	-1	-0.1	-0.005	0.30	-0.005	0.22	0.2	1262	6.7	+220	12	14.54	202
P-2A	508	11	391	121	257	1760	3	0.3	-0.005	-0.050	0.007	0.050	0.058	4101	7.35	-140	16	13.5	146
P-3A	205	6.2	96	17	15.7	498	-1	-0.1	-0.005	0.080	-0.005	0.050	0.2	1264	6.4	+40	14	3.48	210
P-4A	1410	25	385	232	431	3710	-1	-0.1	-0.005	0.050	-0.005	0.050	0.2	8849	6.9	+90	14	7.06	426
P-6	404	7.5	106	21	38.0	799	-1	-0.1	-0.005	-0.050	-0.005	0.050	0.053	2469	7.4	+60	15	9.11	263
P-7	840	12	265	62	115	1620	-1	-0.1	-0.005	0.32	-0.005	0.050	0.6	4109	6.9	+165	14	11.82	165
P-8	400	10	269	96	132	1220	90	0.4	0.021	-0.050	0.042	0.12	0.2	2999	6.5	+50	18	4.64	375
P-9	28	1.7	74	21	3.5	141	-1	-0.1	0.007	0.11	-0.005	0.050	0.043	4145	6.2	+50	13	16.27	194
South Pond	458	19	112	41	352	653	2	1.5	0.018	0.33	-0.005	0.050	0.053	2601	7.9	+130	28		213
South Well	200	16	162	40	78.2	663	-1	4.6	0.12	-0.050	-0.005	0.050	-0.003	1828	6.65	-130	17	4.82	289
GJ84-4	555	8.5	105	24	75.8	1070	-1	-0.1	-0.005	0.30	-0.005	-0.05	0.4	3210	6.9	0	15	6.46	268
GJ84-5	491	7.8	88	31	88.0	1530	-1	-0.1	-0.005	0.07	-0.005	-0.05	0.8	2895	7.3	-10	16	8.43	210
GJ84-8	737	7.0	76	19	40.8	1640	-1	0.1	-0.005	-0.05	-0.005	-0.05	0.011	3827	7.3	+150	15	15.34	207
GJ84-9	414	8.5	146	22	43.1	1060	-1	-0.1	-0.005	-0.05	-0.005	-0.05	0.012	2528	6.9	+110	14	18.84	252
10-19N	1510	17	391	139	307	3130	-1	-0.1	-0.005	0.11	-0.005	-0.05	0.4	6790	7.0	+90	15	12.99	507
13-16N	1660	23	322	92	265	2590	-1	0.5	0.008	-0.05	-0.005	-0.05	0.1	7238	6.75	-160	16	4.43	1156
15-17N	1180	14	254	64	146	2350	-1	-0.1	-0.005	0.21	-0.005	-0.05	1.1	5246	7.0	-100	13	15.24	528
17-13N	79	2.4	50	13	7	221	-1	-0.1	-0.005	-0.05	-0.005	-0.05	0.019	8632	6.7	+110	12	15.31	136

[a] where μmho/cm = micromho per centimeter; mV = millivolt.
[b] Gunnison River sampling location: D = downstream, U = upstream, M = mid-facility.

Table A-4. Analytical Data Set for Water Samples From Grand Junction Projects Office Facility and Gunnison River, October 1986

Location	Concentration (mg/l) Na	K	Ca	Mg	Cl	SO_4	NO_3	PO_4	As	Mo	Se	V	U	Specific Conductance (µmho/cm)[a]	pH	Eh (mV)[a]	Temp (°C)	Depth to H_2O (ft)	Alkalinity $CaCO_3$ (mg/l)
1-9SA	380	9.2	170	31	52.3	964	20	-0.1	-0.005	-0.050	0.027	-0.050	0.1	1950	7.6	+180	16	12.99	264
1-9SB	311	9.7	359	124	81.4	1420	256	0.3	-0.005	-0.050	0.065	-0.050	1.0	2600	7.0	+170	17	11.60	357
10-2NA	710	15.2	310	140	119	2030	128	0.7	-0.005	0.325	0.064	-0.050	2.5	3800	6.9	+165	18	11.46	425
10-2NB	520	12.9	320	110	123	1710	33	-0.1	-0.005	0.605	0.086	-0.050	1.8	2500	5.9	+155	17	11.56	231
11-12NA	380	10.1	260	78	130	1070	66	0.3	0.036	-0.050	0.052	0.180	0.2	2350	6.9	+165	13	4.15	346
11-12NB	350	10.2	240	78	131	1050	60	0.2	0.040	-0.050	0.054	0.202	0.3	2300	7.2	+150	13.5	4.20	363
11-15N	1190	17.0	530	160	426	3430	2	-0.1	-0.005	0.280	-0.005	-0.050	1.2	6000	7.1	+160	15	5.21	633
11-1S	350	7.6	100	46	47.6	866	1	-0.1	-0.005	0.212	0.007	-0.050	1.0	1900	6.7	+140	15	16.31	256
12-7NA	192	14.6	171	36.3	177	347	-1	5.7	0.140	-0.050	-0.005	-0.050	0.002	1700	7.2	-100	17	7.37	574
12-7NB	190	14.9	160	37	179	300	1	5.3	0.190	-0.050	-0.005	-0.050	0.002	1700	7.2	-100	17.5	6.81	534
13-10N	470	18.9	320	44	150	1290	2	0.2	0.102	1.18	-0.005	0.220	1.4	2800	7.0	+150	18	6.27	366
13-16NB	980	20.0	330	82	196	2380	-1	0.2	0.006	0.40	-0.005	0.065	1.4	5000	7.1	-300	15	4.6	554
14-13NA	580	16.5	400	76	163	1920	-1	-0.1	0.006	0.35	-0.005	-0.050	1.2	3600	7.3	-90	17	9.52	405
14-13NB	665	15.9	360	90	204	1890	1	-0.1	0.005	0.52	-0.005	0.065	1.3	3700	7.1	-110	18	10.23	357
14-6NA	90	12.0	40	9	6.6	154	-1	1.1	0.248	-0.050	-0.005	-0.050	0.027	600	6.35	+130	15	15.69	170
14-6NB	102	7.9	48	12	6.6	189	-1	0.4	0.122	0.062	-0.005	0.125	0.1	700	6.3	-80	17.5	16.15	187
3-3NA	480	10.3	280	60	124	1500	-1	-0.1	-0.005	-0.050	-0.005	-0.050	0.029	2500	7.6	-50	16	11.0	134
3-3NB	480	9.9	220	66	114	1460	20	0.2	-0.005	-0.050	0.034	-0.050	0.035	2800	7.4	+50	17	10.85	175
3-3S	520	10.4	260	100	140	1530	70	-0.1	-0.005	-0.050	0.070	-0.050	0.1	3100	7.2	+150	17	12.30	274
3-3S	520	10.4	260	110	139	1540	69	-0.1	-0.005	-0.050	0.070	-0.050	0.083	NA[b]	NA	NA	NA	NA	NA
5-12NA	380	7.5	330	130	199	1480	5	-0.1	-0.005	-0.050	0.013	-0.050	0.055	1800	6.9	+165	17	8.44	490
5-12NB	380	6.8	370	140	194	1530	8	-0.1	-0.005	-0.050	0.016	-0.050	0.063	3000	6.8	+60	17.5	9.06	490
6-2N	310	10.0	260	86	110	1130	52	-0.1	-0.005	0.100	0.098	-0.050	0.8	2500	7.55	+180	17	12.65	295
6-2N	310	10.0	260	88	111	1140	62	-0.1	-0.005	0.094	0.096	-0.050	0.7	NA	NA	NA	NA	NA	NA
7-6S	150	4.0	92	36	20.4	374	10	-0.1	-0.005	0.146	0.019	-0.050	0.6	750	6.5	+150	16	16.83	276
8-4S	420	10.5	400	84	117	1600	3	0.3	0.019	1.58	0.410	1.68	1.3	2450	6.6	+165	16	9.22	355
9-6N	330	8.0	190	74	86.2	869	75	0.5	0.006	-0.050	0.034	-0.050	0.4	2500	7.0	+150	19.5	7.93	260
Dike Ditch	160	17.1	100	30	13.9	446	-1	0.9	0.112	0.646	0.019	-0.050	1.1	780	8.4	+100	18		290
Dike Ditch	160	17.1	100	30	14.2	458	-1	1.0	0.114	0.654	0.018	-0.050	1.1	780	8.4	+100	18		290
GJ84-1	244	15.5	160	34	160	369	-1	3.3	0.305	-0.050	-0.005	-0.050	0.002	1700	7.35	-70	16	7.21	599
GJ84-10	420	4.9	120	28	86.3	883	-1	-0.1	-0.005	-0.050	-0.005	-0.050	0.006	1950	7.4	+190	14	34.67	211
GJ84-11	234	3.4	94.2	27.4	15.6	292	-1	-0.1	-0.005	-0.050	-0.005	-0.050	0.006	1100	7.0	+110	9.5	28.16	435
GJ84-12	430	21.9	360	54	158	1370	3	0.2	0.067	0.808	-0.005	0.210	1.3	3000	6.7	+130	17	5.92	370
GJ84-2	870	9.9	180	22	125	1830	-1	0.2	0.253	-0.050	-0.005	-0.050	0.1	3600	7.6	-30	15	6.79	404
GJ84-3	460	23.0	350	74	177	1560	27	0.2	0.043	0.230	0.017	0.150	0.5	3400	7.1	+145	18	5.15	371
GJ84-6	210	4.4	186	64.8	101	775	-1	-0.1	-0.005	-0.050	-0.005	-0.050	0.028	1800	7.3	+140	16.5	10.72	280
Gunnison (D)[c]	38	2.6	72	26	6.1	223	3	-0.1	-0.005	-0.050	-0.005	-0.050	0.005	600	8.25	+135	13		170
Gunnison (M)[c]	38	2.9	70	25	6.0	230	3	-0.1	-0.005	-0.050	-0.005	-0.050	0.004	600	8.3	+120	14.5		165
Gunnison (U)[c]	37	2.5	73	26	5.7	235	4	-0.1	-0.005	-0.050	-0.005	-0.050	0.005	600	7.75	+100	12		220
North Pond	1330	35.6	290	270	459	3670	2	-0.1	0.014	0.070	-0.005	0.060	0.8	7000	8.2	+150	17		330
North Well	137	14.2	74.8	11.6	17.4	390	-1	0.4	0.376	-0.050	-0.005	-0.050	0.017	900	7.4	+10	15.5	5.28	270
P-1A	350	7.6	210	45	62.5	1060	17	-0.1	-0.005	0.588	0.190	-0.050	1.2	2200	7.2	+160	18	16.0	278
P-10	200	6.5	120	33	33.2	556	-1	-0.1	-0.005	0.430	-0.005	0.27	0.8	1350	6.8	+150	15.5	15.86	255
P-2A	450	10.9	380	120	273	1750	2	-0.1	-0.005	-0.050	-0.005	-0.050	0.048	3300	7.6	+140	17	14.28	235
P-3A	220	7.2	100	19	16.3	610	-1	-0.1	-0.005	0.096	-0.005	-0.050	0.3	1200	7.4	+160	14	3.93	192
P-3B	270	7.0	63	20	17.1	587	-1	-0.1	-0.005	0.120	-0.005	-0.050	0.1	1300	7.6	+30	15	4.99	219
P-4A	1420	26.0	390	260	472	3760	-1	-0.1	-0.005	-0.050	-0.005	-0.050	0.3	5500	7.2	-20	18	7.94	474
P-6	340	7.0	82	18	30.8	704	-1	-0.1	-0.005	-0.050	-0.005	-0.050	0.046	1600	7.3	-100	15.5	10.2	253
P-6	340	7.1	80	19	31.2	760	-1	0.1	-0.005	-0.050	-0.005	-0.050	0.055	NA	NA	NA	NA	NA	NA
P-7	640	9.1	120	30	101	1360	-1	-0.1	-0.005	0.280	-0.005	-0.050	0.8	2400	7.2	+50	15	12.5	293
P-8	350	9.7	230	90	128	1050	77	0.4	0.020	-0.050	0.045	0.130	0.6	2500	7.0	+100	17	4.93	356
P-8	350	9.8	230	92	128	1060	79	0.4	0.022	-0.050	0.046	0.126	0.4	NA	NA	NA	NA	NA	NA
P-9	38	2.6	98	28	6.2	250	-1	-0.1	0.006	0.109	-0.005	-0.050	0.055	700	7.0	+150	15	17	205
South Pond	170	10.6	54	22	153	209	-1	2.9	0.009	-0.050	-0.005	-0.050	0.038	1100	7.8	-150	17		236
South Well	210	16.2	180	44	91.8	680	-1	5.7	0.113	-0.050	-0.005	-0.050	0.002	1700	7.15	-100	15.5	5.17	279
GJ84-4	520	7.8	80	18	76.1	924	-1	-0.1	-0.005	0.38	-0.005	-0.025	0.4	2250	6.9	NA	NA	NA	NA
GJ84-5	860	13.4	210	74	189	2000	-1	-0.1	-0.005	0.18	-0.005	0.030	0.4	3900	6.8	NA	NA	NA	NA
GJ84-8	800	7.8	76	20	31.4	1650	-1	0.1	-0.005	-0.025	-0.005	-0.025	0.012	3050	7.35	NA	NA	NA	NA
GJ84-9	420	8.8	130	21	37.1	980	-1	-0.1	-0.005	-0.025	-0.005	-0.025	0.014	2000	7.3	NA	NA	NA	NA
10-19N	1500	24.1	420	180	417	3830	-1	0.2	-0.005	0.16	-0.005	-0.025	1.1	7000	7.1	NA	NA	NA	NA
13-16N	1300	21.7	270	80	239	2170	1	0.3	0.007	-0.025	-0.005	-0.025	0.1	5000	6.8	NA	NA	NA	NA
15-17N	1100	15.1	280	70	172	2540	-1	0.1	0.010	0.32	-0.005	-0.025	1.0	3150	7.1	NA	NA	NA	NA
17-13N	94	2.9	54	15	7.1	274	-1	-0.1	0.006	-0.025	-0.005	-0.025	0.017	700	7.4	NA	NA	NA	NA

[a]Where µmho/cm = micromho per centimeter; mV = millivolt.
[b]NA = not available.
[c]Gunnison River sampling location: D = downstream, U = upstream, M = mid-facility.

Table A-5. Analytical Data Set for Water Samples From Monticello Millsite, June 1986

Location	Concentration (mg/l)																	Specific Conductance	pH	Eh	Temp	Alkalinity $CaCO_3$
	Na	K	Ca	Mg	Cl	SO_4	NO_3	As	Ba	Fe	Zn	Mo	Mn	Se	V	U	Si	(μmho/cm)[a]		(mV)[a]	(°C)	(mg/l)
13	263	5.0	282	74	127	904	-1	-0.005	-0.10	0.26	-0.010	-0.050	0.16	-0.005	-0.050	0.3	6.4	2128	6.8	+80	14	409
19	58	2.6	153	25	11.3	223	-1	-0.005	-0.10	2.2	-0.010	-0.050	1.0	-0.005	-0.050	0.012	9.1	998	7.2	-25	11	348
26 Lysimeter	2920	34	435	128	45.5	6360	1380	0.051	-0.10	-0.030	-0.010	0.68	1.3	0.35	2.9	0.082	7.0	1342	8.1	+160	15	138
26A Lysimeter	2850	20	459	67	32.8	5550	1300	-0.005	-0.10	0.033	0.066	1.2	2.8	0.15	72	0.092	27	12810	7.6	-190	15	258
26B Lysimeter	255	27	530	134	3.0	2110	-1	0.016	-0.10	-0.030	0.14	0.80	-0.010	0.043	-0.050	18.1	33	4352	7.9	+200	17	240
30A	138	11	164	28	49.9	384	-1	0.030	-0.10	0.32	-0.010	0.084	2.3	0.010	0.87	0.2	8.4	1407	7.1	+40	11	340
30B	370	40	116	28	107	588	-1	0.15	-0.10	0.21	-0.010	0.48	2.8	0.080	4.3	0.6	10	1656	7.35	+150	10	471
30C	224	22	151	28	92.3	446	2	0.13	-0.10	0.031	-0.010	0.39	2.1	0.087	3.8	0.4	11	1701	7.1	+160	13.5	471
31B-East	122	6.0	520	89	40.2	1450	4	0.005	-0.10	-0.030	-0.010	-0.050	0.012	-0.005	-0.050	0.019	9.1	2562	7.0	+20	13	371
31B-West	62	5.2	272	41	45.2	501	6	0.005	0.15	0.73	-0.010	-0.050	0.14	0.008	-0.050	0.044	9.1	1625	7.1	-30	16.5	399
41 Long-2-Dup	122	17	159	25	44.1	321	-1	0.072	-0.10	0.049	-0.010	2.1	1.6	0.054	0.12	0.2	8.1	1244	7.2	-60	12	337
41 (tube 4)	3020	164	74	107	1350	3520	147	2.0	-0.10	0.052	-0.010	98	0.47	1.6	6.2	2.0	11	11790	8.2	-35	12	1640
41 (tube 3)	126	18	156	26	44.2	319	-1	0.073	-0.10	0.10	-0.010	2.2	1.7	0.052	0.090	0.2	8.4	1244	7.2	-60	12	337
41 (tube 1)	3040	166	103	101	1320	3550	172	1.8	-0.10	0.036	-0.010	108	0.33	1.4	6.7	6.5	13	13400	8.25	+40	11	1340
41 (tube 2)	2980	164	110	98	1250	3400	216	2.1	-0.10	0.061	-0.010	116	0.24	1.7	6.5	6.0	7.9	11700	8.1	0	12.5	1526
42	39	4.1	147	22	8.9	206	-1	0.013	-0.10	1.8	-0.010	-0.050	0.44	0.011	-0.050	0.070	9.5	845	7.0	+30	12.5	310
43	42	2.0	170	24	11.4	266	5	-0.005	-0.10	0.19	-0.010	-0.050	0.27	0.010	-0.050	0.013	9.8	966	7.1	+110	10	307
44	36	2.4	146	23	9.9	217	3	-0.005	-0.10	0.44	-0.010	-0.050	0.16	-0.005	-0.050	0.009	9.4	897	7.2	-70	10	285
45	78	6.8	168	30	29.5	315	-1	0.005	0.12	3.8	0.17	-0.050	5.0	-0.005	-0.050	0.073	7.7	1179	7.2	-100	12	372
45A (tube 3)	57	3.8	238	38	43.1	417	5	0.005	-0.10	0.87	-0.010	-0.050	0.25	-0.005	-0.050	0.067	8.0	1323	7.05	-5	13.5	374
45A (tube 2)	57	3.8	242	38	45.3	427	2	0.005	-0.10	0.42	0.051	-0.050	0.17	-0.005	-0.050	0.070	7.7	1344	7.1	-20	13	386
45A (tube 1)	127	6.5	178	32	40.0	394	-1	0.007	-0.10	5.6	0.069	-0.050	1.6	-0.005	-0.050	0.056	8.2	1365	7.25	-100	12.5	385
45B	28	3.2	172	24	17.3	251	7	-0.005	-0.10	0.19	-0.010	-0.050	0.17	0.008	-0.050	0.020	7.3	945	7.0	+100	11	300
50	70	3.6	271	47	25.8	594	10	-0.005	-0.10	0.036	-0.010	-0.050	0.012	-0.005	-0.050	0.024	8.6	1725	7.15	-165	10	396
51	71	3.3	241	31	49.6	405	-1	0.005	0.14	2.2	-0.010	-0.050	1.7	-0.005	-0.050	0.048	8.7	1305	7.35	+75	8	345
52	72.4	3.6	239	40	55.5	400	-1	0.026	0.13	2.7	-0.010	-0.050	2.8	-0.005	0.10	0.075	10	1572	7.2	-30	12	147
58	162	7.1	262	63	89.3	676	27	0.011	-0.10	-0.030	-0.010	-0.050	0.12	0.022	0.41	0.2	11	2208	6.9	+160	10	470
61	745	26	293	160	69.7	2730	1	-0.005	-0.10	4.1	0.014	-0.050	0.24	-0.005	-0.050	0.043	6.8	4968	7.5	-20	10	325
62	680	24	403	226	97.5	3470	15	0.005	-0.10	80	0.26	-0.050	0.97	-0.005	-0.050	-0.003	6.8	4880	5.6	+85	15	98
63	726	16	229	123	69.4	2420	86	-0.005	-0.10	0.83	0.15	-0.050	0.36	-0.005	-0.050	-0.003	6.1	4288	5.8	+170	11	80
65	377	21	184	41	58.5	770	-1	-0.005	-0.10	0.25	0.016	0.15	4.1	-0.005	0.050	0.8	8.7	1794	7.0	+150	10	440
70	54	2.8	56	12	2.8	102	-1	-0.005	-0.10	0.18	0.010	-0.050	0.27	-0.005	-0.050	-0.003	7.9	559	8.1	-20	11.5	225
71	61	3.0	56	12	2.5	100	-1	-0.005	-0.10	0.16	-0.010	-0.050	0.28	-0.005	-0.050	0.003	4.4	576	7.9	+40	13	252
72	178	4.5	6.6	3.8	45.4	20.3	16	0.008	0.62	0.046	-0.010	-0.050	-0.010	0.015	-0.050	-0.003	2.8	780	9.5	-55	12.5	350
73	70	3.3	44	11	3.8	103	-1	-0.005	0.10	-0.030	-0.010	-0.050	0.16	-0.005	-0.050	-0.003	8.2	603	8.1	+160	11	230
7	57	7.8	104	26	14.2	207	1	0.005	-0.10	-0.030	-0.010	0.050	0.017	0.018	0.063	0.2	9.5	1062	6.9	-165	14	298
8	196	8.0	394	101	168	1170	4	-0.005	-0.10	0.032	0.013	-0.050	0.010	0.009	-0.050	0.1	11	2730	6.5	+150	12.5	310
9	133	15	226	50	73.1	579	1	-0.005	-0.10	0.15	-0.010	0.11	0.81	0.015	-0.050	0.4	9.1	1125	6.95	+130	14	404
Carbonate Seep	767	56	39	52	246	999	-1	1.5	-0.10	0.054	-0.010	124	0.023	0.17	0.63	1.4	7.0	3675	9.0	-140	15.5	603
Mill 1	500	3.3	3.8	1.6	44.7	0.7	-1	-0.005	0.22	0.11	-0.010	-0.050	0.015	-0.005	-0.050	-0.003	3.2	1688	8.1	-90	14	935
Mill 2	58	3.1	5.1	4.1	4.2	37.2	-1	-0.005	-0.10	-0.030	-0.010	-0.050	0.011	0.007	-0.050	-0.003	0.27	275	8.8	-110	14	110
Mill 3	104	2.4	18	4.6	4.0	36.1	-1	-0.005	-0.10	2.2	-0.010	-0.050	0.54	-0.005	-0.050	0.014	3.4	621	7.6	-130	10	274
Montezuma Canyon	34	2.3	80	21	24.7	175	2	-0.005	-0.10	-0.030	-0.010	-0.050	0.017	-0.005	-0.050	0.038	3.3	780	8.5	+150	19.5	164
Sorenson	26	2.1	81	14	10.6	148	3	-0.005	-0.10	-0.030	-0.010	-0.050	0.051	0.008	-0.050	0.066	5.4	639	8.1	+160	17.5	156
W-2	2430	161	65	92	1120	2710	70	2.2	-0.10	0.26	-0.010	112	0.095	0.51	5.2	1.4	13	8925	9.2	+110	22.5	1507
W-3	11	1.0	61	8.5	3.0	86.0	3	-0.005	-0.10	-0.030	-0.010	-0.050	0.017	-0.005	-0.050	-0.003	5.6	460	7.7	-135	18	135
W-4	17	1.4	74	11	5.7	108	3	-0.005	-0.10	-0.030	-0.010	-0.050	0.036	0.023	-0.050	0.026	5.6	465	7.9	+150	18.5	131
W-4 (Dup)	16	1.4	74	11	5.8	111	4	-0.005	-0.10	-0.030	-0.010	-0.050	0.034	0.009	-0.050	0.026	5.6	465	7.9	+150	18.5	131
20	38	NA[b]	NA	NA	15.6	381	2.7	-0.005	-0.10	0.17	NA	NA	0.53	-0.005	NA	NA	NA	1027	7.0	NA	NA	NA
77	41	NA	NA	NA	2.9	104	-0.2	-0.005	-0.10	-0.10	NA	NA	0.28	-0.005	NA	NA	NA	476	7.7	NA	NA	NA
36A	1180	NA	NA	NA	104	3410	22.7	-0.005	-0.10	0.14	NA	NA	13.0	-0.005	NA	NA	NA	5586	7.0	NA	NA	NA
76	90	NA	NA	NA	3.2	40.9	-0.2	0.006	0.17	-0.10	NA	NA	-0.05	-0.005	NA	NA	NA	510	7.8	NA	NA	NA
40A	295	NA	NA	NA	90.3	579	-0.2	0.059	-0.10	0.22	NA	NA	3.04	-0.005	NA	NA	NA	2010	7.2	NA	NA	NA
74	73	NA	NA	NA	3.9	110	-0.2	-0.005	-0.10	-0.10	NA	NA	0.11	-0.005	NA	NA	NA	540	7.7	NA	NA	NA
1	422	NA	NA	NA	118	988	2.1	0.029	-0.10	-0.10	NA	NA	4.43	0.009	NA	NA	NA	2850	7.3	NA	NA	NA
75	94	NA	NA	NA	4.4	94.5	-0.2	-0.005	-0.10	-0.10	NA	NA	-0.05	-0.005	NA	NA	NA	565	7.8	NA	NA	NA

[a]Where μmho/cm = micromho per centimeter; mV = millivolt.
[b]NA = not available.

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Table A-6. Analytical Data Set for Water Samples From Monticello Millsite, October 1986

Location	Concentration (mg/l) Na	K	Ca	Mg	Cl	SO_4	As	Mo	Se	V	U	Specific Conductance (μmho/cm)[a]	pH	Eh (mV)[a]	Temp (°C)	Depth to H_2O (ft)	Alkalinity $CaCO_3$ (mg/l)
13	249	5.0	220	58	96.5	760	-0.005	-0.050	-0.005	-0.050	0.6	1650	6.75	-60	11.5	5.40	356
19	37	3.0	209	31	11.9	395	-0.005	-0.050	-0.005	-0.050	0.023	850	6.85	+80	12	10.68	231
26	593	38	526	216	NA	NA	0.026	1.4	0.16	0.270	41.2	NA[b]	NA	NA	NA	NA	NA
26A	2605	19	431	76	NA	NA	-0.005	47	0.12	-0.050	0.1	NA	NA	NA	NA	NA	NA
26C	2465	38	365	124	NA	NA	0.057	23	0.30	11	0.060	NA	NA	NA	NA	NA	NA
29	3725	25	331	89	NA	NA	0.056	13	0.013	3.9	15.6	NA	NA	NA	NA	NA	NA
30A	109	11	164	27	42.8	406	0.029	0.103	0.012	0.603	0.2	1000	7.1	+120	13.5	21.50	348
30B	302	44	114	27	118	524	0.17	0.457	0.067	4.3	0.5	1500	7.15	+130	13	17.88	453
31B-East	158	7.7	594	121	40.8	1920	-0.005	-0.050	-0.005	-0.050	0.024	1150	6.35	+40	12	5.17	245
31B-West	124	8.6	440	93	33.0	1380	-0.005	-0.050	-0.005	-0.050	0.057	1500	6.4	+50	13	6.34	267
41 (tube 3)	108	17	154	24	39.6	337	0.084	-0.050	0.057	2.2	0.2	1000	6.75	+50	11.5	NA	340
41 (tube 2)	2680	158	139	127	1630	3420	2.4	8.8	3.6	105	1.8	8500	7.6	+120	13	NA	1219
41 (tube 4)	2740	182	123	118	1530	3320	2.0	9.2	3.0	101	2.6	8000	7.3	+80	12.5	NA	1219
41 (tube 1)	2675	171	136	125	1610	3460	2.5	8.9	3.3	108	2.7	9000	7.6	+200	13.5	NA	1390
42	36	4.2	154	22	14.5	245	-0.005	-0.050	0.021	0.133	0.090	700	7.15	+160	10	39.21	324
42	33	4.2	154	22	13.9	235	-0.005	-0.050	-0.005	0.124	0.092	700	7.15	+160	10	39.21	324
43	32	2.6	269	37	14.3	591	-0.005	-0.050	0.006	-0.050	0.019	1000	6.75	+85	10	10.2	192
44	32	2.8	192	28	10.5	346	-0.005	-0.050	-0.005	-0.050	0.012	800	6.75	-50	11	12.35	230
45	68	7.1	156	25	18.5	281	-0.005	-0.050	-0.005	-0.050	0.074	900	6.8	-30	12.5	NA	258
45A (tube 3)	48	3.7	200	36	22.8	402	-0.005	-0.050	-0.005	-0.050	0.053	950	6.8	+50	11	NA	365
45A (tube 2)	52	3.9	202	36	22.9	424	-0.005	-0.050	-0.005	-0.050	0.058	950	6.6	+100	12	NA	366
45A (tube 1)	86	6.9	172	34	29.4	408	-0.005	-0.050	-0.005	-0.050	0.056	1000	7.0	-40	12	NA	396
45B	33	3.7	188	27	11.1	354	-0.005	-0.050	-0.005	-0.050	0.026	600	6.75	-70	12.5	5.10	408
50	80	4.1	274	50	37.8	680	-0.005	-0.050	-0.005	-0.050	0.037	1200	6.8	+190	12	15.66	396
51	56	3.3	186	35	26.4	384	-0.005	-0.050	-0.005	-0.050	0.048	900	6.6	+160	11.5	10.3	361
52	78	4.0	185	35	40.5	421	0.016	-0.050	-0.005	0.905	0.1	1000	6.9	+160	11.5	21.66	375
58	182	7.6	212	58	86.8	660	0.009	-0.050	0.010	0.355	0.5	1400	6.2	+140	12	7.24	367
61	703	28	275	187	73.0	2640	-0.005	-0.050	-0.005	-0.050	0.001	2750	7.1	-60	9	29.35	245
62	544	22	290	204	80.4	2790	-0.005	-0.050	-0.005	-0.050	-0.001	2400	5.2	+60	10	19.62	NA
62	523	23	292	209	79.9	2860	-0.005	-0.050	-0.005	-0.050	0.003	2400	5.2	+60	10	19.62	NA
63	656	16	202	132	74.0	2240	-0.005	-0.050	-0.005	-0.050	0.003	2900	5.9	+130	12	27.1	78
65	296	23	154	40	57.7	722	0.006	0.144	-0.005	0.104	0.9	1500	8.0	+165	9	20.36	509
66	283	13	125	26	235	543	-0.005	-0.050	-0.005	0.103	0.061	900	7.5	+120	12	10.52	255
70	57	2.7	53	10	3.3	101	-0.005	-0.050	-0.005	-0.050	-0.001	113	6.8	+10	13	36.69	113
70	58	2.7	52	10	3.4	99.9	-0.005	-0.050	-0.005	-0.050	-0.001	500	6.8	+10	13	36.69	113
71	54	2.7	54	11	3.1	101	-0.005	-0.050	-0.005	-0.050	-0.001	450	6.6	+155	11	36.68	96
72	159	5.0	8.0	3.8	55.3	26.2	0.005	-0.050	0.008	-0.050	-0.001	600	8.45	+100	11	35.89	234
73	58	3.0	60	11	3.1	99.6	-0.005	-0.050	-0.005	-0.050	-0.001	400	7.5	+10	10.5	35.35	215
7	124	12	204	53	73.0	666	0.005	0.055	0.007	0.096	0.2	1300	6.4	+150	12	9.05	228
8	162	7.8	339	96	179	1080	-0.005	-0.050	-0.005	-0.050	0.091	1800	6.0	+155	12.5	9.67	231
9	109	14	129	32	27.4	320	-0.005	0.134	-0.005	-0.050	0.5	950	6.8	+130	12	5.51	285
Carbonate Seep	473	41	41	32	160	545	0.94	0.460	-0.005	11	1.1	1100	8.5	+165	12.5		475
Mill 1	398	3.3	3.9	1.6	45.3	1.8	-0.005	-0.050	-0.005	-0.050	-0.001	1200	7.9	+50	15	86.61	892
Mill 1	402	3.3	3.8	1.5	45.4	7.5	-0.005	-0.050	-0.005	-0.050	-0.001	1200	7.9	-50	15	86.61	892
Mill 2	47	3.1	7.3	4.6	4.0	32.4	-0.005	-0.050	-0.005	-0.050	-0.001	190	9.1	+130	13	105.38	31
Mill 3	85	3.1	17	4.8	8.4	22.3	-0.005	-0.050	-0.005	-0.050	0.005	325	7.35	-170	12	96.1	258
Montezuma Canyon	129	53	116	44	90.6	472	-0.005	-0.050	-0.005	-0.050	0.1	800	7.65	+125	6.5	NA	95
N. Drainage	60	7.4	94	17	61.3	116	-0.005	-0.050	-0.005	-0.050	0.017	600	7.8	+130	6	NA	180
W-2	1812	132	37	71	1020	2300	1.5	5.6	1.8	83	1.6	7000	9.7	+150	18	NA	799
W-3	28	2.2	108	17	6.5	136	-0.005	-0.050	0.006	-0.050	0.002	3250	7.7	+125	6	NA	153
W-4	66	82	142	25	43.5	317	0.009	-0.050	0.008	0.221	0.1	900	7.6	+150	10	NA	291
W-5	100	71	168	37	51.8	434	-0.005	0.057	0.007	0.105	0.2	900	7.5	+160	7	NA	214
1	521	37	194	53	133	1190	0.033	0.527	0.008	1.07	3.4	2200	6.8	+160	NA	19.5	532
20	51	1.9	340	47	16.9	681	-0.005	-0.050	0.014	-0.05	0.006	1150	6.95	+80	NA	17.9	331
30C	214	21	160	27	88.9	454	0.11	0.322	0.071	4.25	0.3	1200	8.2	+150	NA	18.5	375
36A	744	44	277	98	139	1870	0.011	0.787	-0.005	0.525	10.3	4500	6.9	+150	NA	43.2	NA
40A	334	46	140	30	101	610	0.057	0.350	-0.009	0.449	1.0	1500	7.15	+120	NA	21.7	435

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[a]Where μmho/cm = micromho per centimeter; mV = millivolt.
[b]NA = Not available.